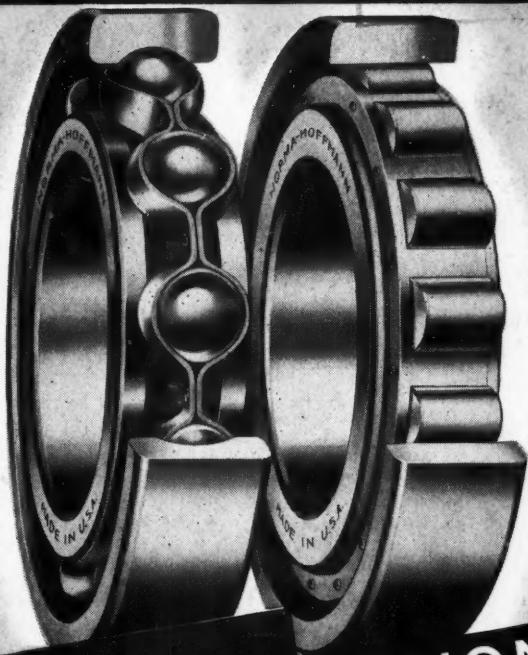


TECHNOLOGY DEPT.

MODERN Machine Shop

April, 1946

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TWIN PRECISION

NORMA-HOFFMANN
BALL BEARINGS

Rugged—thoroughly dependable for
carrying thrust and radial loads.

Feature all the precision, the fine-ness,
the friction-free smoothness for every
load, speed and duty. Sizes as small as
1/8 of an inch, and up to 22-1/2" in bore.

NORMA-HOFFMANN
ROLLER BEARINGS

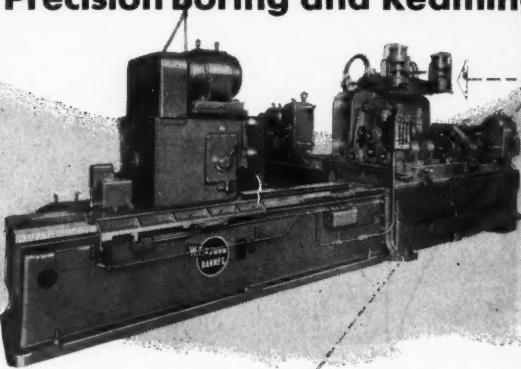
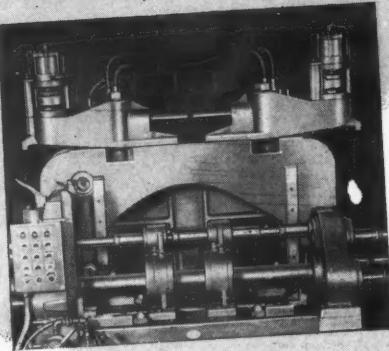
Extraordinary in their ability to
absorb punishment

Short, cylindrical roller design — heavy
duty bronze retainer — superb work-
manship and finish — lowest possible
coefficient of friction under heavy load

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN. — FOUNDED 1911
BALL, ROLLER AND THRUST BEARINGS

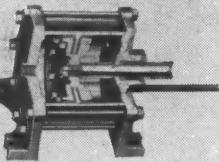
"LOGAN" AIR CYLINDERS

Provide Fast, Accurate, Positive Locking of Engine Block for Precision Boring and Reaming



Logan Air Cylinder Design Assures Peak Performance and Long Life

- Maximum power without leakage assured by molded composition packing cups, self-adjusted by air.
- Permanent seal around rod provided by "C" ring packing, self-adjusted by air.
- Quicker response obtained through larger ports.
- Higher pressures permitted by more sturdy construction. Heavy duty nickel-chrome iron covers. Bronze bushing supports and aligns piston rod.
- Cylinders can be furnished with cushioning at one or both ends to eliminate shock at end of stroke.



Standard Types and Sizes

LOGAN Air Cylinders are manufactured in standard sizes from 1½" to 24" bore, with any length of stroke to 18 feet. Seven standard mounting types, interchangeable end covers permit combination mountings. For operation at pressures to 150 p.s.i.

WRITE FOR FREE CATALOGS

Write for Catalog S-25 on LOGAN Air Cylinders and Air Valves, Bulletin 371 on Remote Air Operating Systems and Bulletin 600 on the new LOGAN R-F-L Unit (air regulator-filter-lubricator).



ARMS OF CLAMPING FIXTURE SWING AWAY FOR LOADING AND UNLOADING SPECIAL MACHINE

The fast-acting, positive operation with follow-up of LOGAN Air Cylinders helps to materially reduce floor-to-floor time and maintain close tolerances on this Diesel engine block job.

Multiple boring and reaming operations are performed simultaneously on a W. F. and John Barnes hydraulic special machine. Ten spindles are carried in three horizontal heads located at the left, right and rear of the work station.

For loading, the two arms of the special air-powered clamping fixture are turned to the sides, permitting the workpiece to be lifted into position. The arms are then swung out over the part, and the operator turns the handle of the air control valve to activate the two LOGAN Air Cylinders, locating and locking the engine block. Tolerances are held to .001" on crankshaft and camshaft bearing seats and .0005" on dowel holes machined in the subsequent operations, due to the accurate holding provided by LOGAN Air Cylinders adapted to the special clamping fixture.

WHERE TO USE LOGAN AIR CYLINDERS

On manufacturing and processing jobs in any industry, LOGAN Air Cylinders can be employed effectively and profitably for an almost unlimited range of applications. They are used for pushing, lifting, pressing, holding, pulling, clamping, forcing and other power movements or combinations of movements in any direction. Cylinder operation is fast, positive and uniform . . . the power is under complete and easy control from any convenient type of air valve.



Logan
Air and Hydraulic Equipment
LOGANSPORT MACHINE CO., INC.

CHUCKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS

801 CENTER AVE.
LOGANSPORT
INDIANA

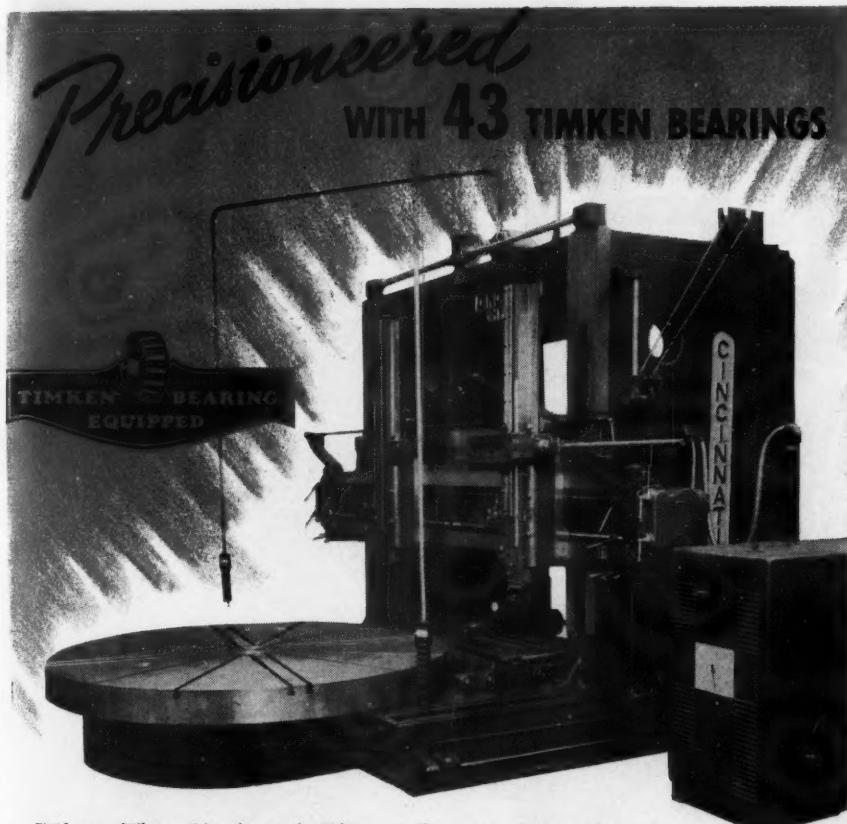
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April, 19



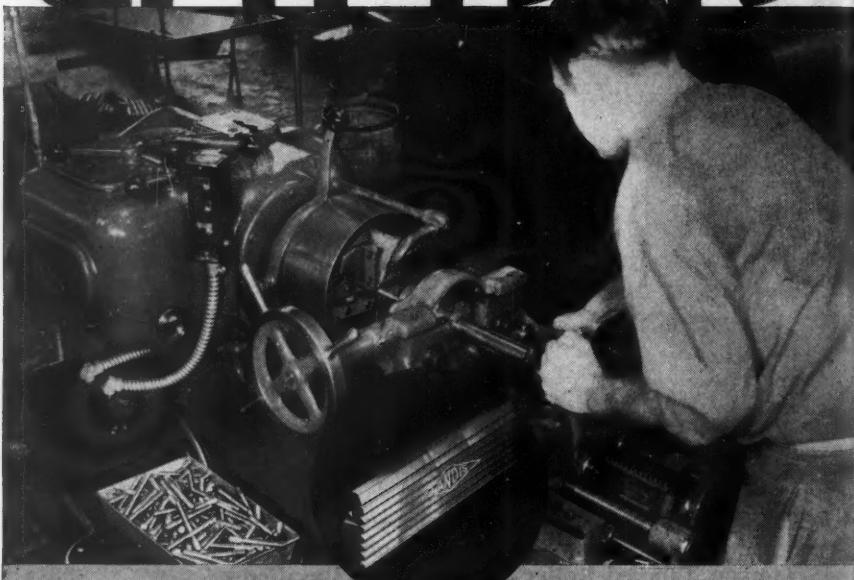
When The Cincinnati Planer Company's engineers designed this 12' to 18' Hypro Extension Boring Mill, 43 Timken Tapered Roller Bearings were specified to assure precision roughing and finishing operations.

Besides adding the final touch of precision, the 43 Timken Bearings installed in this boring machine eliminate friction and wear; save power; simplify lubrication; increase endurance; reduce maintenance; prolong machine life. They are applied in the main drive, table, feed boxes and rail.

No matter what kind of equipment you may manufacture or use, it will pay you to specify Timken Roller Bearings and to make sure the trade-mark "TIMKEN" appears on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.



LANDIS



THREADING

MACHINERY

THREAD CUTTING
DIE HEADS

Greater Accuracy
Higher Production
at Lower Cost....
Write for Catalog

COLLAPSIBLE
TAPS

LANDIS MACHINE COMPANY
WAYNESBORO, PENNSYLVANIA. U.S.A.

Why we wouldn't sell the customer more than *ONE* machine

Another example of how Heald Engineering cuts production and equipment costs

Yes—we actually made it possible for one machine to handle the job, although the customer thought he wanted two! Here's his original inquiry:

"Please forward proposal and quotation covering one Heald No. 81 Size-Matic Internal Grinder for grinding inside diameter . . . also, proposal and quotation on a suitable grinder for grinding bottom of same part." That looked like an order—for two machines. But Heald engineers had a better answer. They knew that with special arrangement one Size-Matic could handle both those grinding jobs at once!

Result? The manufacturer made an immediate saving of about 50% on equipment . . . reduced his space and manpower requirements . . . and substantially cut his production costs.

It is engineering like this which can easily mean the difference between profit and loss on any production line, especially in these days when so many other factors may be beyond control. Whether your plant operation involves high speed mass production requiring hundreds of workers, or whether you operate a small shop employing only a handful, Heald engineers will be glad to study your production with an eye to cutting costs. There's no obligation, of course. For further details, write:
THE HEALD MACHINE COMPANY,
Worcester 6, Mass.

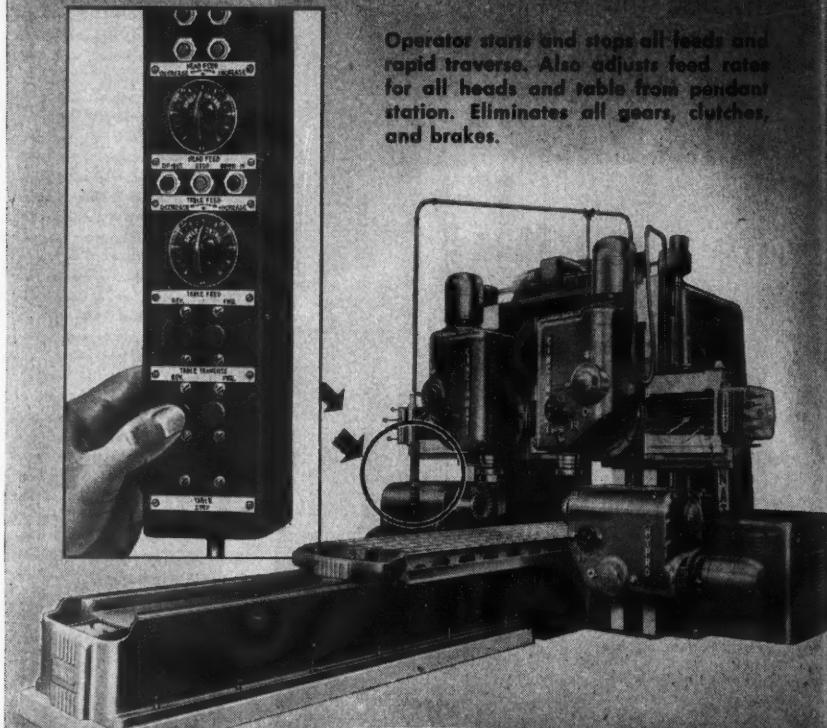
HEALD

means finer precision
lower costs

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

AN ENTIRELY NEW DEVELOPMENT...

HYPRO-electronic PLANER MILLER DRIVE



Operator starts and stops all feeds and rapid traverse. Also adjusts feed rates for all heads and table from pendant station. Eliminates all gears, clutches, and brakes.

THE CINCINNATI **HYPRO** PLANER COMPANY
PLANERS - BORING MILLS - PLANER TYPE MILLERS
CINCINNATI, OHIO

You can
put your finger
on the **EXTRA**
LOAD-CARRYING
CAPACITY
in these

SPEED REDUCERS

ONE look at the continuous tooth herringbone gears in a Farrel Speed Reducer tells you what gives these gears their extra strength and load-carrying capacity.

In place of the center groove found in some herringbone gears, you see the extra tooth area formed where the helices meet to make the teeth continuous across the face. This extra tooth area is known as the *backbone*. It puts the entire width of the gear to work, providing greater capacity to withstand shocks, stresses and heavy loads.

Precision generated by the famous Farrel-Sykes process, the *Gear with a Backbone* is widely known throughout industry for its smooth, quiet, efficient operation. Its combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure distribute the load on the



teeth uniformly, reducing wear and maintaining correct tooth action through a long gear life.

Other features which contribute to smooth, efficient power transmission in Farrel Speed Reducers include rigid and accurately ground shafts properly mounted in roller bearings, and heavy section cases that hold rotating elements in precise alignment.

These speed reducing units are available in a complete range of sizes for any capacity. Ratios of single reduction units range from 1 $\frac{1}{4}$:1 to 10:1, double reduction units up to 60:1, and triple reduction units up to 180:1. Write for descriptive Catalog No. 438. FB-256



FARREL-BIRMINGHAM COMPANY, INC.

344 VULCAN ST., BUFFALO, N. Y.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron,

Los Angeles, Tulsa, Houston, Charlotte



**WHY
You Should Buy
Your DISC
GRINDING
ABRASIVES
From a
Disc
Grinder
Builder**

**Send for This
Handy Booklet
On GARDNER
Abrasive Discs**



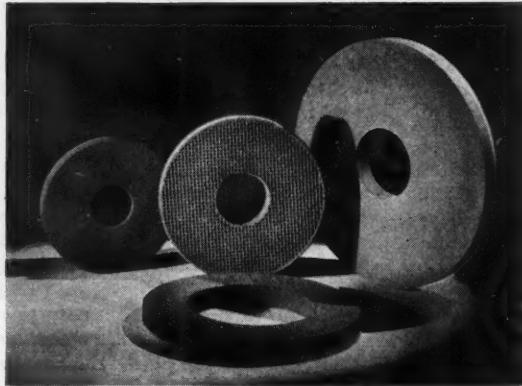
Contains 20 pages of
helpful information
covering the proper
selection, application
and use of abrasives.

Let our engineers "time study" your
difficult grinding jobs. No matter
what kind of work you are handling
on your Disc grinders, GARDNER
can supply the right abrasives for
them.

THE RIGHT abrasive discs will keep
down your grinding costs and insure
better accuracies. As the only Ameri-
can manufacturer who builds both
DISC GRINDERS and the **ABRASIVES**
used upon them, our recommendations

give you the assurance of
undivided responsibility. If
your flat-surfacing costs are
too high, or you are encoun-
tering checking, burning or
distortion, our combined
grinder and abrasive-build-
ing experience is available to
specify abrasive discs that
WILL solve your problems.

**A Size and Type
for EVERY Flat
Surface
Grinding Job**

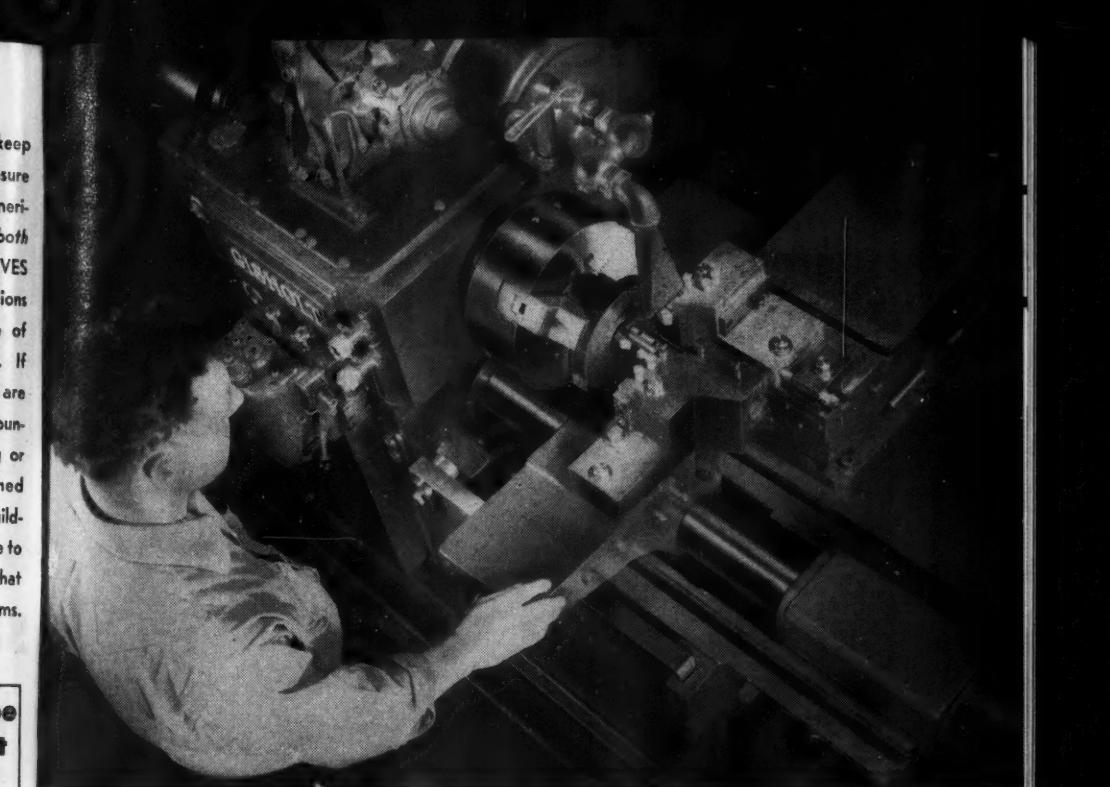


**GARDNER - GRIND
YOUR Flat SURFACES**

GARDNER MACHINE COMPANY
428 East Gardner Street • • • Beloit, Wisconsin, U.S.A.

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MIDDLE-OF-LIMITS ACCURACY . . . year after year with

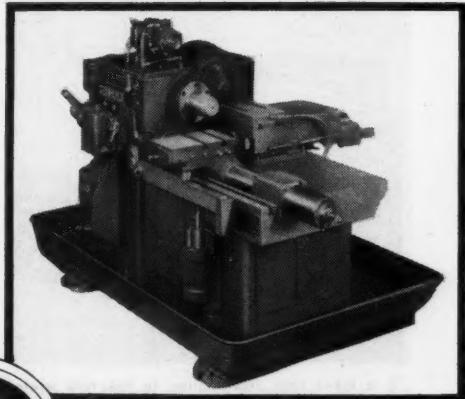
THE GISHOLT HYDRAULIC AUTOMATIC LATHE

You won't have the usual loss of accuracy caused by wearing parts—even after years of service—with this modern automatic lathe—for here are no complicated mechanisms to wear. Its simplicity reduces moving or mechanical parts to a very minimum.

All parts having to do with tool movement are completely surrounded by oil and lubricated under pressure. Both carriages move on hardened and ground steel surfaces. For all practical purposes, there is no wear out. Further, since both front and rear tool slides feed against and dwell at positive dead stops, utmost accuracy in finished dimensions is insured.

With this advanced automatic lathe, you can count upon middle-of-limits performance for years on end. Moreover, you can count upon trouble-free operation that cuts maintenance bills to the vanishing point! Write for complete information.

GISHOLT MACHINE COMPANY
1219 E. Washington Ave. • Madison 3, Wis.



THE GISHOLT HYDRAULIC AUTOMATIC LATHE provides a 12" swing over front carriage. Although it is a heavy, rugged machine, it is also well suited for light, fast jobs.

Look Ahead... Keep Ahead... with Gisholt

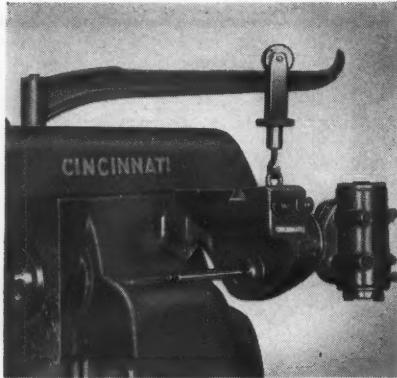
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Cincinnati Offers —

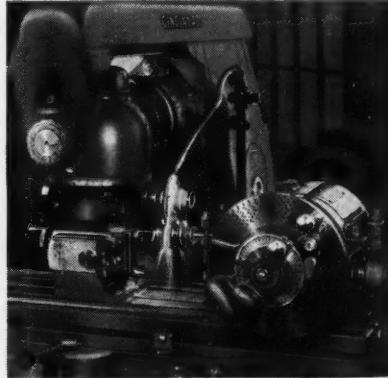
OVER 300

ABOVE: Index Base in spite of its name this is a high production unit intended to carry two fixtures. One is reloaded while the part in the other is being milled. (Publication M-1448.)

BELOW: Circular Milling Attachment, with power feed drive. For rotary milling operations. May also be toolled up for continuous milling. 16", 20" and 24" sizes available. (Publication M-1025-1)



It takes little imagination to see how useful this High Speed Universal Milling Attachment can be. Here it is supported by an individual crane attachment, mounted on a Cincinnati No. 2 Mill. (Publication M-803-2)



Universal Spiral Milling Attachment and Dividing Head equipped with Wide Range Divider. Individually, these two attachments have an exceptionally wide range of uses. (Publications M-804-1 and M-1016-1)

THE CINCINNATI MILLING MACHINE CO.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPENING MACHINES . . .

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ODIFFERENT MILLING ATTACHMENTS

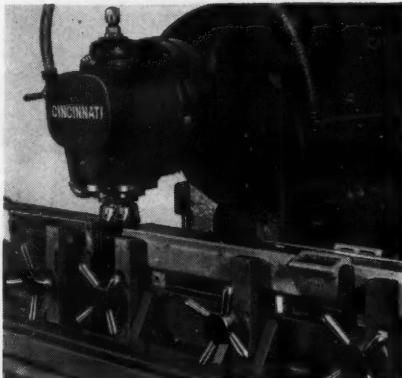
to Simplify Tooling and Improve Methods

Most milling machine attachments have this in common . . . they may be purchased as an afterthought—at any time the need arises to handle a different type of operation; to raise quality; to increase production; to minimize equipment costs. One or more of these desirable results may be gained from each of the 35 types and styles of milling attachments offered by Cincinnati Milling. Six of them are shown here. All are illustrated and briefly described in attachment circular M-1382. Write for your copy today.

CINCINNATI



Milling a fixture part held in a No. 5 plain Vise. Jaws may readily be changed to special designs suitable for the work. Swivel, tool-maker, and all-steel vises also available. (Publications M-1013-1, M-988, and M-1247)



Heavy Vertical Milling Attachment. Does the work of a vertical machine. Spindle head may be swiveled 45° right and left. (Publication M-960-1)

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

HINES . . . CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPING MACHINES

KEEP PRODUCTION UP...

KEEP COSTS DOWN

with KNIGHT MILLERS

By producing on a single miller, through ordinary methods, jobs that often require two or more machines, Knight Millers are proving every day their unusual value as a time-saving, profit-building investment in hundreds of plants, shops and toolrooms everywhere.

Eliminating special set-ups and the transfer of complicated milling, boring or shaping jobs from one machine to another, ups production and saves operator's time. Knight's tilting, swiveling table makes costly jigs and fixtures unnecessary for out-of-the-ordinary work and greatly increases working area. Wide variation in spindle feeds and speeds provide for the use of many various size cutters.

These features, combined with Knight's acknowledged advantages of speed, precision, accuracy, ruggedness, smooth operating simplicity and convenience mean faster, more efficient operation, uncommon economy in productive hours and a minimum of equipment expense.

How you can keep production up and costs down are all explained in Knight's Catalog which you may have for the asking.

Write for YOUR Copy Today!

W.B.KNIGHT

MACHINERY COMPANY

MORE GOODS for MORE PEOPLE at LOWER COST

3920 WEST PINE BLVD. • ST. LOUIS 8, MISSOURI



N-5099 6K12

10 MODERN MACHINE SHOP

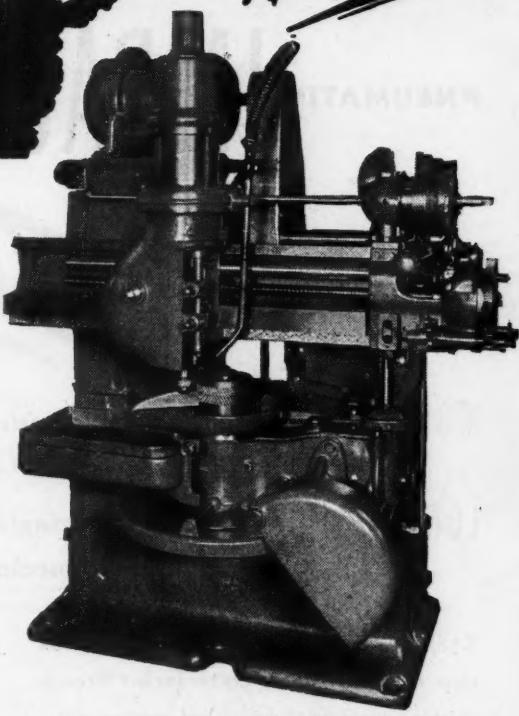
April, 1946

THE ONE-MACHINE GEAR SHOP

*Ready for
Anything*

The All-Purpose Fellows 6-Type Gear Shaper is a Machine with which you can:

- ✓ CUT A WHOLE RANGE OF GEARS OF GIVEN PITCH WITH 1 CUTTER
- ✓ CUT INTERNAL AS WELL AS EXTERNAL GEAR TEETH
- ✓ CUT A HERRINGBONE GEAR WHEN REQUIRED
- ✓ CUT GEARS TO RUN AT "OFF-STANDARD" CENTER DISTANCES
- ✓ CUT A KEYWAY OR INTERNAL OR EXTERNAL SPLINES
- ✓ CUT CLUSTER AND SHOULDER GEARS WHEN REQUIRED
- ✓ CUT CHAIN SPROCKETS, RATCHET TEETH OR SPECIAL SHAPES
- ✓ DUPLICATE A NON-STANDARD GEAR EVEN INDEXING BY HAND IF NEED BE
- ✓ DISK AN INTERNAL—OR EXTERNAL BLANK IF NO OTHER MEANS ARE AVAILABLE



A 6-Type Fellows Gear Shaper will equip you to cut gear teeth or special contours on external work up to 35 inches diameter, and internal work up to 24 inches diameter . . . The machine's versatility is beyond comparison. Ask for a descriptive circular and renew your acquaintance.

THE FELLOWS GEAR SHAPER COMPANY

78 River St., Springfield, Vermont 640 West Town Office Bldg., Chicago, Ill. 616 Fisher Bldg., Detroit 2, Mich.

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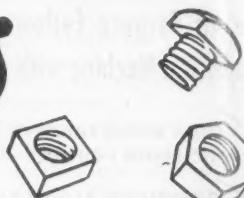
1946

NEW... AND READY FOR IMMEDIATE DELIVERY

PNEUMATIC

IMPACT WRENCH

by *Thor*



MORE POWER—*for Faster, Positive Driving and Removing of Nuts, Bolts and Cap Screws.*

LONGER LIFE—*through amazingly simple, sturdy, new impact mechanism.*



EASILY THE MOST POWERFUL tool of its class, the new THOR Reversible Impact Wrench quickly and surely *drives and removes* nuts, bolts and cap screws up to $\frac{3}{8}$ ". Light and compact, it is easy to handle even in hard-to-reach places. Pneumatic powered, it is extremely simple in construction for long life and fool-proof operation.

A revolutionary, new impact mechanism—exclusive with Thor—delivers *direct blows* that *automatically assure maximum*

striking power. The tool stays *on the job longer without losing its original impact force!* Simplified design lessens stress and provides smoother operation—to reduce wear and increase tool life.

Ready now for immediate delivery. Your nearest Thor branch or representative will be glad to arrange an early demonstration.

INDEPENDENT PNEUMATIC TOOL CO.
600 W. Jackson Blvd., Chicago 6, Ill.

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MILWAUKEE NEW YORK PHILADELPHIA PITTSBURGH ST. LOUIS
SALT LAKE CITY SAN FRANCISCO TORONTO, CANADA LONDON, ENGLAND

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GRIP THROTTLE
Model No. 6

SMALLEST, LIGHTEST TOOL OF ITS CLASS!

HERE'S FULL POWER ... LONGER!

New THOR high-power impact mechanism provides direct, positive drive to the impact spindle.

Stress is lessened on the working parts by placing the two impact jaws at a wider radius to the spindle center.

Because a new face for each jaw is rotatively delivered to the anvil for each blow, the impact jaws naturally wear longer.

Short, rigid, spindle shank delivers blow close to the work.

HERE'S HANDLING EASE!

- The lightest, smallest tool in its class— $3\frac{3}{4}$ pounds, $5\frac{1}{8}$ inches long.
- Torque reaction to the operator is practically eliminated.
- Motor reverses quickly, simply by pressing convenient side button.

AUTOMATIC LUBRICATION!

- Oil reservoir in handle automatically feeds proper amount of lubricant to motor with compressed air.

LEVER THROTTLE (Optional)

Coming Soon!

MORE NEW THOR
IMPACT WRENCHES
—in $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and
 $1\frac{1}{2}$ " CAPACITIES.
Watch for Them!



... *Thor* ... PORTABLE POWER
TOOLS

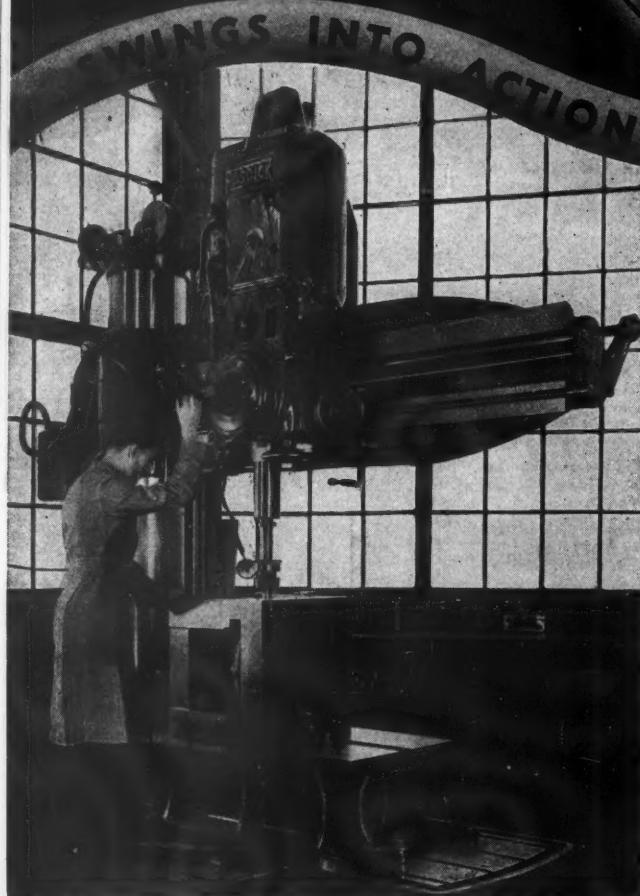
PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY
ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

nearest
glad to

OL CO.

LOS ANGELES
ST. LOUIS
ENGLAND

FOSDICK RADIAL



EX-CELL-O CORPORATION

The part being drilled is on one of many parts of various Ex-Cell-O machines that are drilled, tapped or bored on the sturdy, time and labor saving FOSDICK RADIAL DRILL.

A box jig holds the work while drilling, reaming or tapping various diameter holes from two or more sides.

Note the convenience and time-saving features of centralized control in the head, wide range of feed and speed changes, as well as hand feeds are instantly available.

If your work can be handled on a Radial, it can be done on a Fosdick. Write for Bulletin MSR for full particulars.

FOSDICK

MACHINE TOOL CO.
CINCINNATI 23, OHIO

April,

*Common Sense Assembly
Engineering*

**SAVES A MINUTE...
AND MULTIPLIES
IT BY THOUSANDS**

IT'S CERTAINLY sound common sense to save any assembly time which does not add to your product or your profits. The way the I. T. E. Circuit Breaker Company of Philadelphia saved it . . . in assembling switchboards and circuit breakers. They used P-K Self-tapping Screws everywhere possible, in many kinds of materials. The minutes saved by eliminating individual tapping operations are multiplied many thousands of times in assembling this kind of apparatus. That rates as *common sense assembly engineering!*

You don't know . . . we don't know . . . whether or not P-K Screws would save you money on your assembly job. But we do know that in 7 out of 10 jobs submitted to us, P-K Screws do the job better, for less. Why not find out if your job is one of the lucky seven?

Let a P-K Assembly Engineer prove it

The way one manufacturer makes fastenings with P-K Self-tapping Screws illustrates only a small part of the advantages of these unique fastenings. Maybe your product needs some of the many other advantages of P-K Screws. With the help of a P-K Assembly Engineer you can find out . . . either by his calling on you, or your mailing in assembly details . . . both without obligation. Parker-Kalon Corp., 208 Varick St., New York 14, N. Y.

Sold Only Through Accredited Distributors



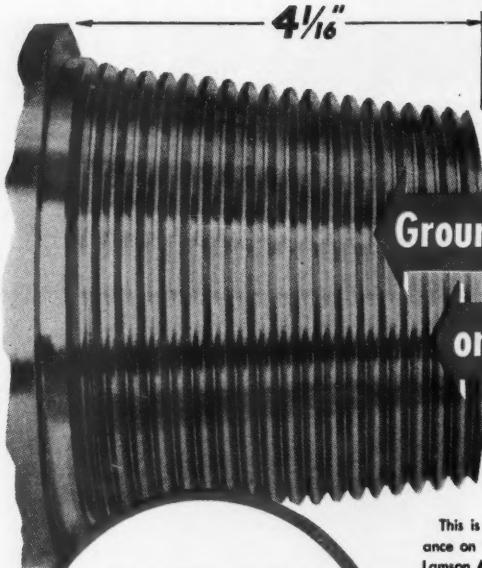
PARKER-KALON

A FASTENING FOR EVERY METAL AND PLASTIC ASSEMBLY

P-K

SELF-TAPPING SCREWS

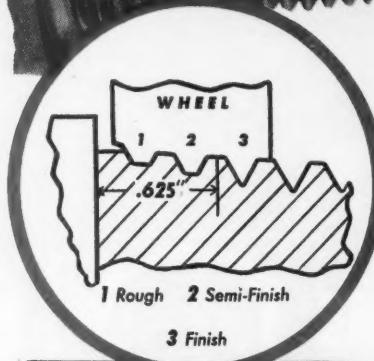




Ground from the solid with

one pass of the wheel,

in less than 4 min.



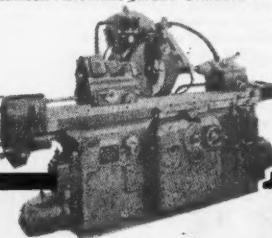
For shorter threads, other multi-rib wheel forms can be used—the full rib type that requires only one complete revolution of the work, and the alternate rib type that requires two complete revolutions. Our engineers can determine the most advantageous method for your needs.

This is a typical example of multi-rib wheel performance on tough, heat-treated steel forgings with Jones & Lamson Automatic Thread Grinders.

The 5-pitch, special form API thread, with a taper of 3 inches per foot, and a mean outside diameter of 4.117", is ground in less than 4 minutes cutting time with a three-rib wheel, one rib roughing, one semi-finishing and the third finishing. More than one pound of metal is removed.

Rapid metal removal, accuracy of form and quality of finish are assured by the FULLY AUTOMATIC WORK CYCLE of Jones & Lamson Automatic Thread Grinders, which includes AUTOMATIC DIAMOND DRESSING OF THE WHEEL, automatic compensation for the amount dressed off the wheel, and automatic sizing.

Why not phone today for one of our engineers to tell you more about production threading with Jones & Lamson Automatic Thread Grinders.



Jones & Lamson
Automatic Thread
Grinder



JONES & LAMSON

MACHINE COMPANY
Springfield, Vermont, U.S.A.

Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

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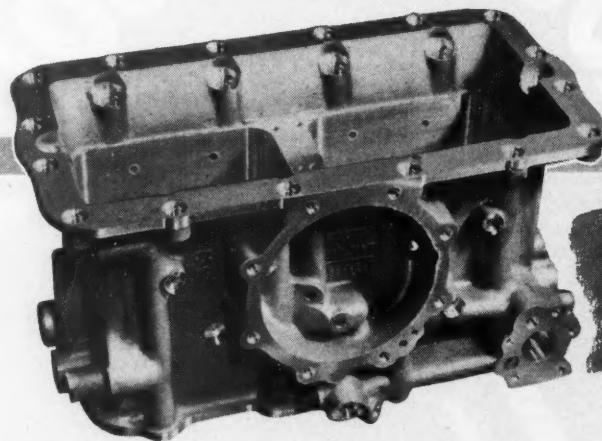
GROUND FROM THE SOLID



JARVIS

THE JARVIS COMPANY
MANUFACTURERS OF
MACHINERY FOR
THE METAL INDUSTRY

Eliminates Hand work on C



"IT WOULD have been extremely difficult to build carburetors to the high standards set by the Army Air Corps if it had not been for the lead screw Tapping & Threading Machines produced by Warner & Swasey," reports the Illinois Division of Bendix Aviation Corporation, Chicago.

One example of the work done at Bendix on Warner & Swaseys is a complicated magnesium casting used as a throttle body for an aircraft carburetor. This part calls for 8 holes tapped $\frac{5}{16}$ " - 18, $\frac{3}{8}$ " deep to a Class 4 fit and 16 holes tapped $\frac{7}{16}$ " - 20, $\frac{3}{4}$ " deep to a Class 4 fit. Because these tapping operations are near the completion of the machin-

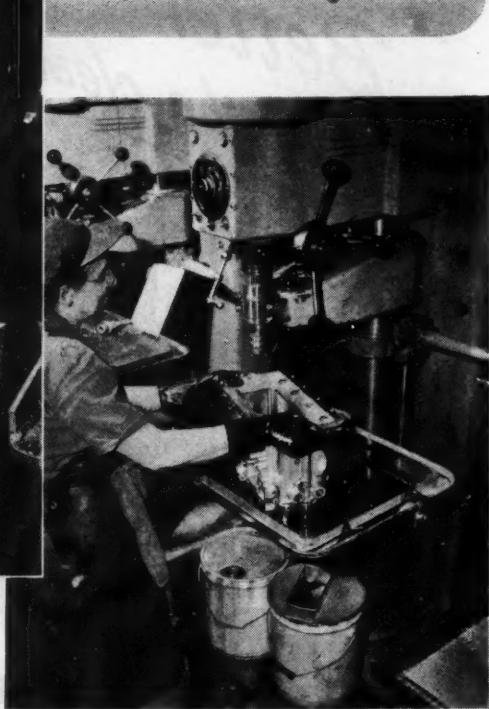
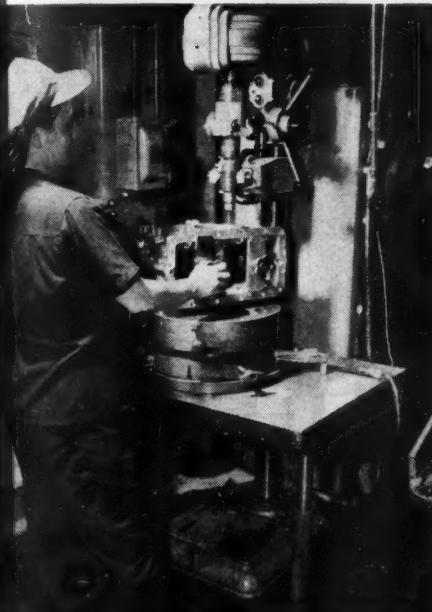
ing process on the part, error in any tapped thread would result in costly scrap loss.

Today, Bendix taps these threads completely by machine—eliminating all hand work and reducing the human error element to an absolute minimum. The result: better production, far lower scrap loss on a tough job!

What Warner & Swasey Precision Tapping & Threading Machines have done here and in dozens of other plants in war production, they can do for you in getting better peacetime products at lower costs. We'll be glad to make test runs of sample parts to show you what these machines can do!

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY 100

on Class 4 threads at Bendix



• *Tapping 8 holes to a Class 4 fit,
5/16"-18 thread in magnesium on No.
11 Warner & Swasey Precision
Tapping & Threading Machines.*

y tapped
ap loss.
ds com-
all hand
n error
m. The
er scrap

on Tap-
one here
produc-
ng better
We'll be
parts to
can do!

SWASEY
LATHES, SADDLE AND RAM TYPES - CHUCKING AND
TOOLS - MULTIPLE SPINDLE AUTOMATICS - PRECISION
TAPPING AND THREADING MACHINES

**WARNER
&
SWASEY**
Machine Tools
Cleveland



The small diameter of Apex adjustable stud setters assures you fast, smooth, right-the-first-time results—in the open or in close quarters—for hand or power operation. You cut mistakes and assembly time to the bone. In a few seconds you can adjust these rugged tools to desired length of

thread. Four sizes cover the full range of studs up to 1 $\frac{1}{4}$. Shanks: Morse taper, hex, T-handle, female square, or combination T-handle with female square for use with a torque wrench. Types: for any make of power tool . . . Prompt quotes on specials. Write Dept. M for Bulletin No. 101-A.

THE APEX MACHINE AND TOOL COMPANY, DAYTON, OHIO

APEX

**STUD
SETTERS**

Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screw Drivers, Hand Drivers for Phillips and Clutch Head Screws, Aircraft and Industrial Universal Joints, Sockets and Universal Joint Socket Wrenches.

"LENOX"



Has The Right Blade For Every Job

THE
"LENOX"
METAL CUTTING
FAMILY

HACK SAWS
HACKMASTER
MO-SPEED
HIGH SPEED
STANDARD
SUPERFLEX

BAND SAWS
DIEMASTER
SKIP-A-TOOTH
METAL CUTTING
WOOD CUTTING

LENOX BLADES are made to meet the demands of Metal Cutting Men who accept no excuses, whose standards are results. They are stocked by Distributors everywhere who will give you immediate service for your needs.

Buy LENOX Today.

"The Blades in the Plaid Box"

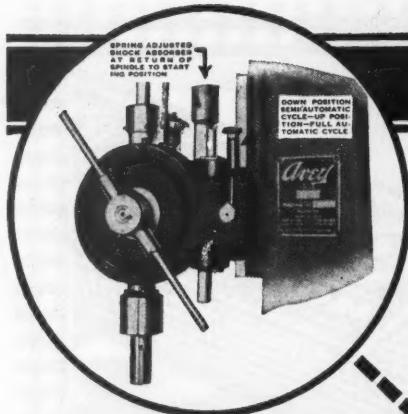
AMERICAN SAW & MFG. CO., SPRINGFIELD, MASS.

FUD
TERS

, Parallel
for Phil-
Vrenches.

ril, 1946

Avey FEATURE No. 4



**THE *Avey* TYPE MA-6
AVEY-MATIC POWER FEED
HAND FEED AND REVERSING
MOTOR TAPPING MACHINE**

features

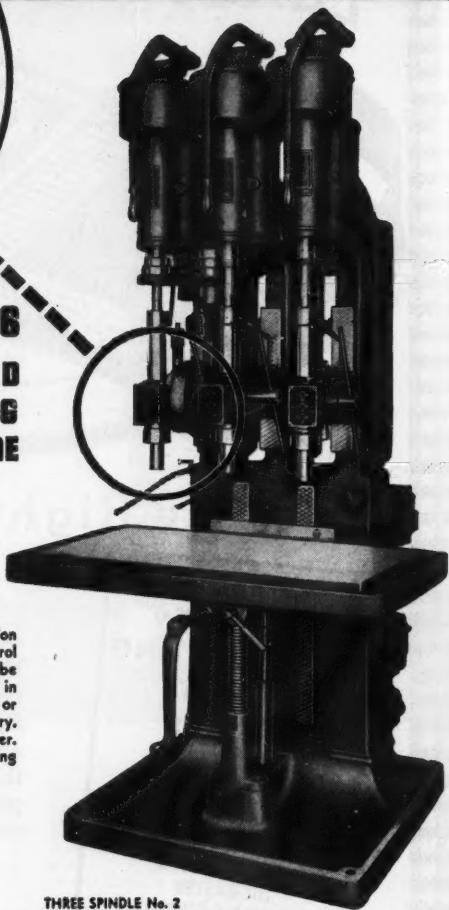
**single lever control
for automatic or
manual operation**

Single lever control — feed engaged with forward motion of feed lever. Automatic disengagement by dog control or by single hand lever. AVEY automatic feed may be applied to any or all spindles. Worm and worm wheel in constant engagement, running in oil. No friction shoes or dogs that require replacement. No adjustment necessary. Quick advance or over-running feed by hand feed lever. Can be arranged for full automatic cycle by changing position of handle at rear of unit.

Type MA-6 is made in following capacities:

- No. 2 — $\frac{7}{8}$ " capacity in cast iron.
- No. 3 — $1\frac{1}{4}$ " capacity in cast iron.

THE AVEY DRILLING MACHINE CO.
CINCINNATI • OHIO • U. S. A.



**THREE SPINDLE No. 2
TYPE MA-6 • COMBINATION MACHINE**

- 1st Spindle - Avey-matic Feed
- 2nd Spindle - Hand Feed
- 3rd Spindle - Tapping (Reversing Motor)



MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK

AUTOMATICALLY-LOADED Lo-swing IMP handles various length and diameter bushings

Problem: Turning and facing both ends of a variety of bronze bushings on automatically loaded lathe. Bushings to vary in length and diameter, and to come to machine rough cast with hole broached.

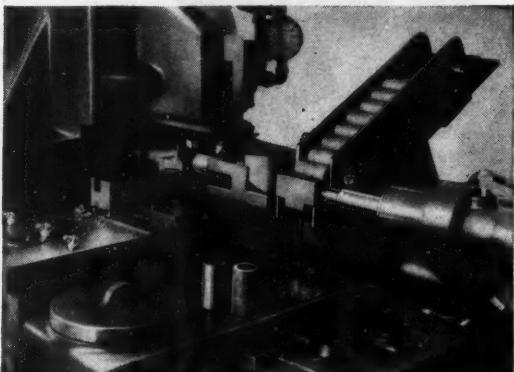
Solution: Bushings are loaded onto an expanding arbor by a plunger which picks up the bottom bushing from the inclined chute shown in upper illustration. A movable stop locates the bushing on the arbor and then withdraws to allow tools on the Third Slide (see lower illustration) to face both ends of the bushing to length. Simultaneously, the Front carriage tool turns the O.D. A stripper kicks the finished bushing off the arbor and into the unloading chute while tools are returning to starting position.

When bushings of another diameter are to be turned, ease and quickness in change-over are provided. The operator merely changes the arbor loading plug, makes a quick adjustment to take care of longitudinal tool travel, and resets the tools. If there is sufficient change in bushing diameter to necessitate a different spindle speed, a change of easily-accessible pick-off pulleys makes this a simple operation. The loader chute is made adjustable to accommodate various bushing lengths and diameters.

The Lo-swing IMP worked out very well on this job due to the availability of the Third Slide for the facing operations, thus leaving the rear of the machine open for loading and unloading. Tungsten Carbide Tools were used on this job with speeds and feeds set accordingly. Other inherent IMP features, such as rigidity, accuracy at high speeds, and ease of change-over contributed also in large measure to the satisfactory solution of the job.

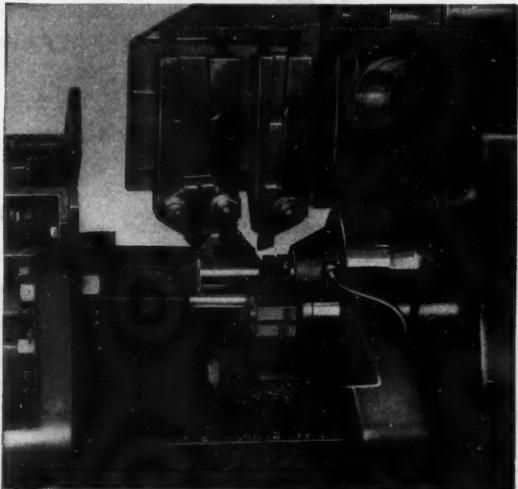
SENECA FALLS MACHINE CO.

Seneca Falls, N. Y.



Above: Close-up view from front of machine showing Loader Chute and Loading Plunger.

Below: Close-up view from rear of machine, showing Movable Stop and clear view of tooling.



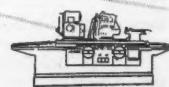
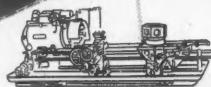
1946
THE NEWS from SENECA FALLS



FLASH

... NEW
CUTTING FLUID
COVERS 85 PERCENT
OF ALL
METAL-WORKING JOBS!

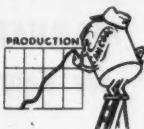
No wonder production-wise plant executives are pricking up their ears! The reason is CIMCOOL—the cutting fluid that gives *new meaning* to "multi-purpose." It's welcome news when one cutting fluid covers *eighty-five percent* of all metal-working jobs! And it's better still when that cutting fluid combines *high cooling capacity* with *high friction reduction* in a degree never before attained! Good news on paper becomes *great news* on the production lines when you SPECIFY CIMCOOL!



CIMCO

Why CIMCOOL Provides the Lowest Unit Cutting Fluid Cost

CIMCOOL helps increase production rates. Increased cooling capacity permits higher cutting speeds and feeds. Grinding wheels cut more freely. Low surface tension allows small chips and grit to settle out rapidly.



CIMCOOL helps increase tool life. Chemical lubricity reduces tool wear. Tools are kept cool to touch. Increased wetting action permits greater penetration between tool and chip.



CIMCOOL reduces down-time on machines. Fewer tool changes and fewer changes of cutting fluid are necessary. Pump and supply lines are kept clean. No spoilage.



CIMCOOL facilitates accuracy. Freer cutting reduces pressure. Uniform temperature is maintained on work and on machine. Dirt does not stick to work or gages, permitting faster, more accurate gaging.



CIMCOOL is tops with operators. It restricts bacterial growth, does not contain animal or vegetable oils subject to rancidity, and is not a skin irritant. Smoke, objectionable odors and hot chips are eliminated.



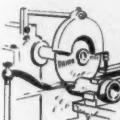
CIMCOOL is safest. Fire hazards are eliminated. Absence of slippery film on operator's hands, machine controls, work and floor reduces danger of accidents. Restriction of bacterial growth limits risk of infection.



CIMCOOL contains a rust inhibitor good for the life of the fluid for protection of machine and work. It does not contain any chromates or highly alkaline components which may be irritating.



CIMCOOL is applicable to 85% of all metal-working operations requiring cutting fluids. It replaces all water emulsions and all but very highly compounded specialty oils for selected jobs.

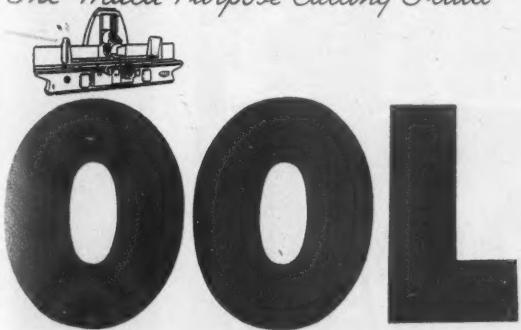


A case in point... The Leland Electric Company of Dayton, Ohio, users of CIMCOOL in their tool room and machine shops, report that elimination of foreign deposits and rancidity has effected a 50 percent reduction in "down-time" per machine. With CIMCOOL on a cut-off wheel operation, they

report an average production of 450 pieces per wheel dressing—200 pieces over the former average. Further, no case of dermatitis has been reported for seven months. Citing savings in money, man-hours, efficiency and workers' health, company officials declare, "CIMCOOL is by far the best cutting fluid we have ever used!"

THE CINCINNATI MILLING MACHINE COMPANY Cincinnati 9, Ohio, U.S.A.

The Multi-Purpose Cutting Fluid



Manager, CIMCOOL Division
Cincinnati Milling Machine Co. MS-4
Cincinnati 9, Ohio, U.S.A.

Please send me a copy of "What is CIMCOOL?"

Please have sales representative call.

Name _____

Company _____

City _____ State _____

Capacity . . .

MARVEL 18

for Size,

MARVEL 6A and 9A

for Volume Production

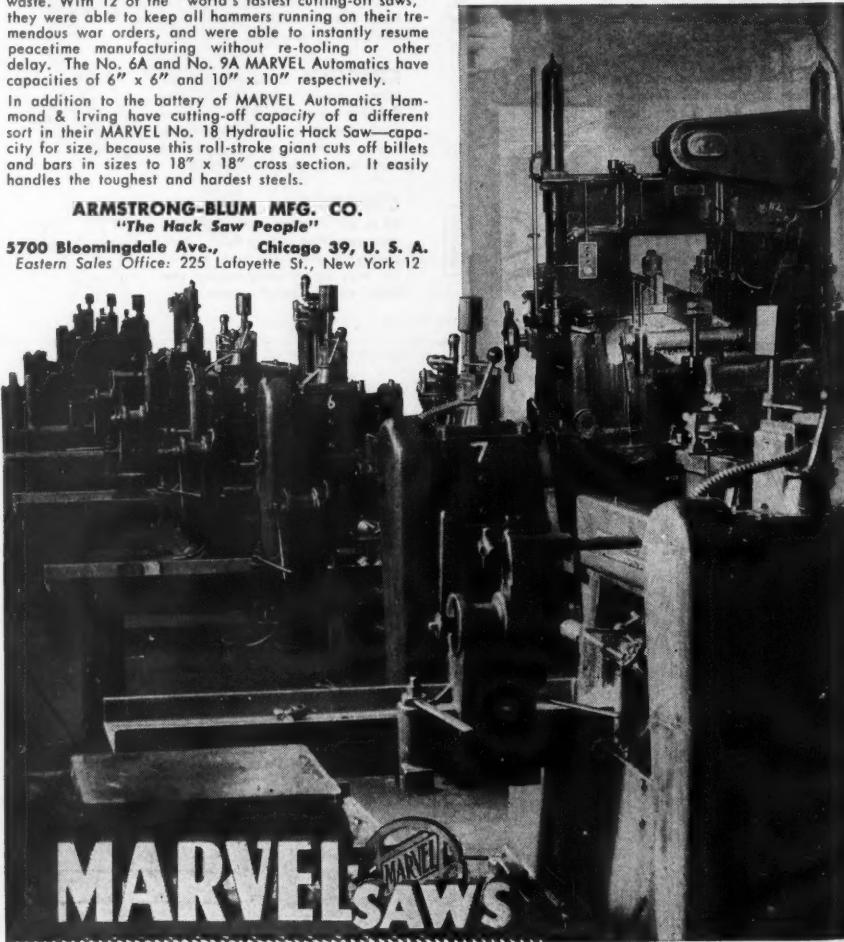
With this battery of twelve No. 6A and No. 9A MARVEL High Speed Automatic Hack Saws, the Hammond & Irving Forge Co. of Albany, New York, can cut-off billets automatically, not only in tremendous numbers, but in accurate weights and sizes to exactly fill each die without waste. With 12 of the "world's fastest cutting-off saws," they were able to keep all hammers running on their tremendous war orders, and were able to instantly resume peacetime manufacturing without re-tooling or other delay. The No. 6A and No. 9A MARVEL Automatics have capacities of 6" x 6" and 10" x 10" respectively.

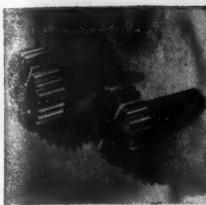
In addition to the battery of MARVEL Automatics Hammond & Irving have cutting-off capacity of a different sort in their MARVEL No. 18 Hydraulic Hack Saw—capacity for size, because this roll-stroke giant cuts off billets and bars in sizes to 18" x 18" cross section. It easily handles the toughest and hardest steels.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago 39, U. S. A.
Eastern Sales Office: 225 Lafayette St., New York 12

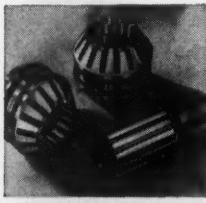




Over 50% of involute spline gages used are made by Vinco.



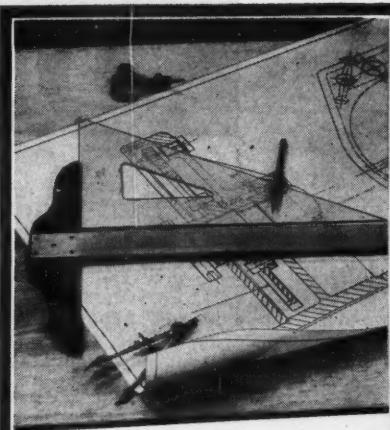
Vinco Serration Gages—standard of quality in accuracy and finish.



Accurate in every minute detail—
Vinco Straight Sided Spline Gages.



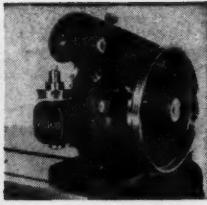
Longer life of gaging accuracy—
Vinco Plain Plug and Ring Gages.



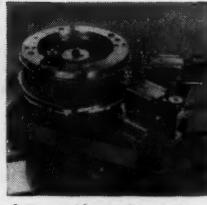
Let us take it from here on

The design may require close gaging—it could be a precision part to be subcontracted—it might need special jigs and fixtures to produce it. Whatever is required, call VINCO!

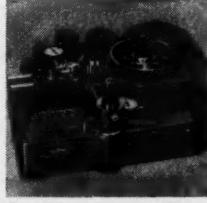
Twenty-five years of pioneering and perfecting methods of operation enables VINCO to manufacture precision products of the highest uniform quality—your assurance that any VINCO product or service will meet all specifications and conform to your particular needs. On any question of gaging, inspection control or precision production call VINCO first—it may save you both time and costly trouble.



The Vinco Dividing Head—accurate checking of angular spacing.



Built-up and Special Gages—
precision throughout.



Gear Rolling Inspection Fixtures—
provide rapid, close check of gears.



Jigs and Fixtures—
Vinco precision products made to Vinco standards.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

VINCO CORPORATION • 71 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Plain Cylindrical Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Muntion Gages • Propeller Shaft and Hub Gages • Built-up and Special Gages • Gear Rolling Inspection Fixtures • Indexing Fixtures • Hydraulic Power Control Utilization and Distribution Units • Engineering Design and Development • Precision Production Parts.

They Came to

VINCO

With a job that had to be licked

We delivered — — — delivered SO well that our customer intimated he would be very happy if his competitors were kept in the dark about it; for he is producing powdered metal parts, and the accuracy and finish of the VINCO made elements are largely responsible for the decided edge he holds over competing manufacturers.

We appreciate this customer's position, so will say no more.

But we are not betraying a confidence when we say that the same knowledge and skill which served him so successfully is also available to others in solving similar precision problems.



This battery of VINCO Master Involute Checkers is an essential factor in our precision production of tooling parts. They accurately show the "amount of roll" and the amount of deviation from true involute profile, thus holding stops to an absolute minimum. Investigate the VINCO Master Involute Checker; it could be a vital factor in your production program. Please request.

MILLIONTHS OF AN INCH FOR SALE BY VINCO

VINCO CORPORATION 27 CHAFFEE HIGHWAY, DETROIT 27, MICHIGAN SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND

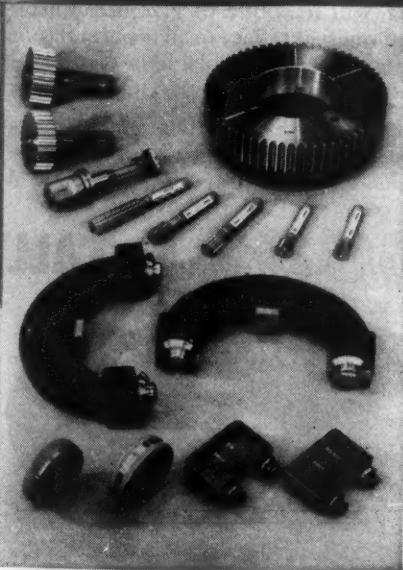
Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Plain Cylindrical Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Monition Gages • Propeller Shaft and Hub Gages • Built-up and Special Gages • Gear Rolling Inspection Fixtures • Indexing Fixtures • Hydraulic Power Control, Utilization and Distribution Units • Engineering, Design and Development • Precision Production Parts

VINCO pioneered in the development of spline gaging and was the first to demonstrate the importance of an absolute control over all the essential elements of spline gages during production.

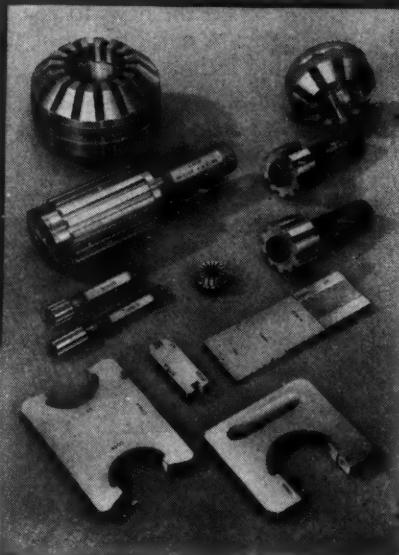
Up until now, no one had ever attempted to analyze the overall gaging requirements and a proper use of the gaging equipment. Indiscriminate use of contradictory or incomplete gaging methods only created confusion during production and resulted frequently in improper assembly; a direct result of failure to establish and adhere to a proper and comprehensive gaging policy. That is why we strongly urge a thorough survey of gaging requirements before production. The only practical approach to this survey is an early consultation with gaging engineers who are specialists in analyzing and developing efficient gaging control programs for production schedules. A proven, reliable source for this highly specialized information can be found at **VINCO**. **VINCO's** Engineering Department, backed by years of study and development, is thoroughly qualified for this important service to splined parts production.

VINCO CORP. • DETROIT 25, MICHIGAN

Inverse Spline Gages



Serration Spline Gages



Straight Sided Spline Gages

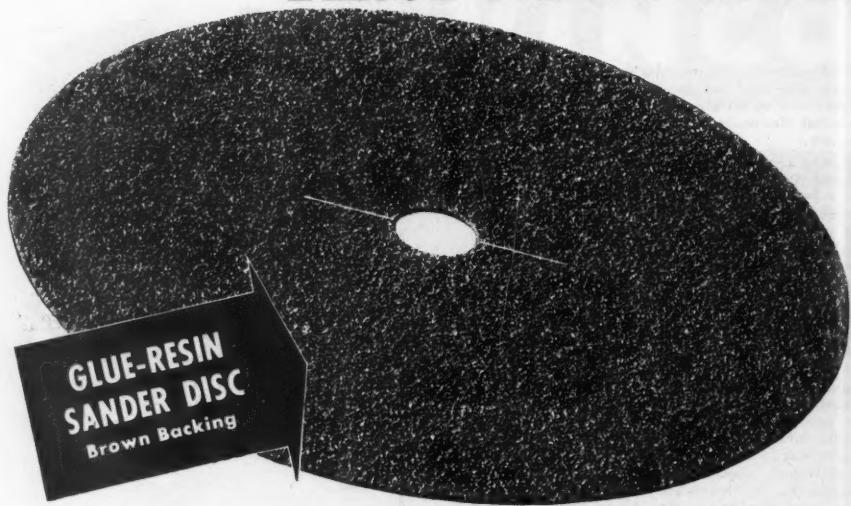
CO
LEVELAND
Becker
Serration
Thread
Shaft and
Hydraulic
Power

il, 1946

April, 1946

MODERN MACHINE SHOP 29

FIRST NEWS about



This is the first information on two new sander discs by CARBORUNDUM. They have such improved performance that we want to get the news to you as soon as possible. A quick listing of advantages would include:

- 1—Substantially longer life.
- 2—Faster cutting. 3—Heat resistant. 4—Broad application in metal surfacing.

The obvious benefit, of course, will

prove to be more production at lower abrasive cost.

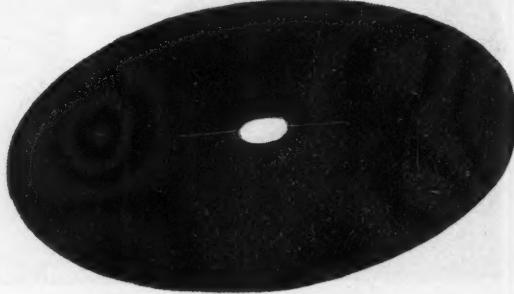
The Glue-Resin Sander Disc by CARBORUNDUM, with brown backing, will be found to give broad usage and unusual service in all metal surfacing operations. It is available in the following six grit sizes: 16, 24, 36, 50, 60, 80.

The Resin-Sander Disc, with green backing, and same grit selection as the Glue-Resin Disc by CARBORUNDUM

For sanding and finishing satisfaction... CALL IN



"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company



out a BIG improvement in Sander Discs



is specially recommended for severe sanding operations and the edge-wear grinding jobs which take such a heavy toll of ordinary discs. The backing of both discs are marked for ready identification, usage and reordering.

These discs by CARBORUNDUM are standard in 7" and 9½" dia. The Glue-Resin Sander Discs are available in Type

D-1 (center hole with slits) while the Resin Sander Discs are available in Type D-2 (center hole only). Prompt deliveries will be made from standard stocks in plant and branch warehouses.

Call your CARBORUNDUM salesman or distributor's representative for complete information. The Carborundum Company, Niagara Falls, N. Y.

ALL IN CARBORUNDUM

TRADE | MARK

BONDED ABRASIVES

WHEELS

- Silicon Carbide
- Aluminum Oxide
- Diamond
- Cylinder Hones
- Sticks, Stones & Rubs
- Specialties

COATED ABRASIVES

- Paper, Cloth and Combination
- Sheets, Rolls, Discs

ABRASIVE GRAINS AND COMPOUNDS

- for:
- Polishing
- Lapping
- Pressure Blasting
- Finishing

TAP PRECISION

Through the Years

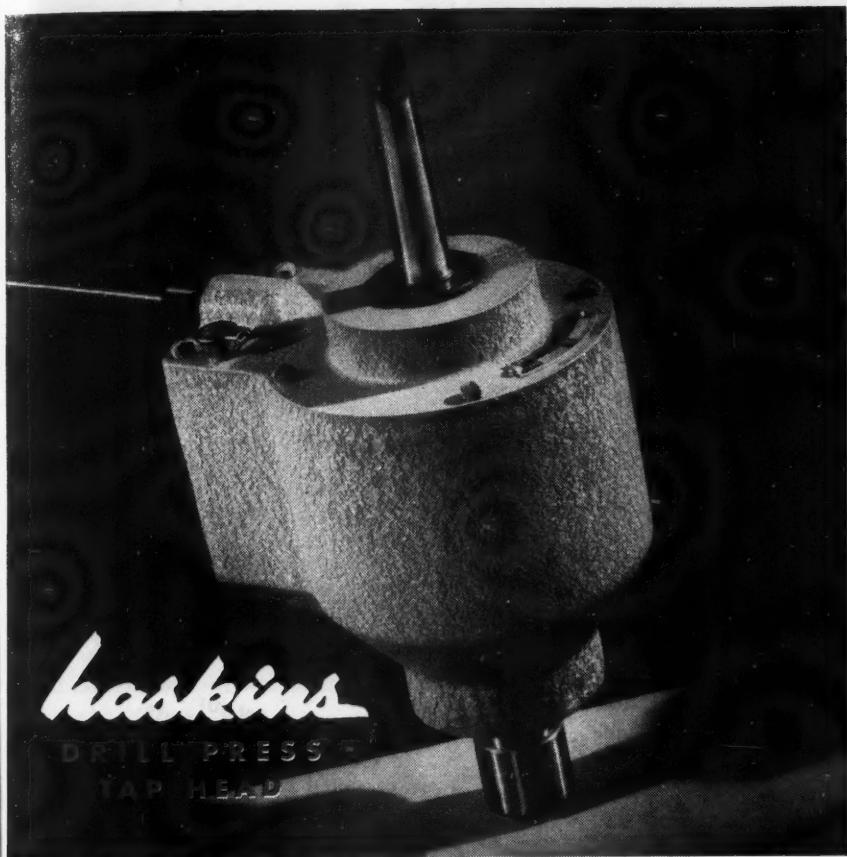


- In the past, BATH TAPS have always had the reputation of cutting clean, accurate threads. This is due, in part, to their being ground from the solid after hardening.

In the future, BATH TAPS will continue to give you tap precision to fulfill your demands for accuracy and long life.

Write for Folder.

JOHN BATH & COMPANY, INC.
WORCESTER • MASS.



DRILL PRESS
TAP HEAD

The same quality tap head which Haskins features in its high-speed Electric-Air controlled tapping machine. It easily fits your own drill press to provide more economical production, greater tapping accuracy, longer trouble-free operation. Send for catalog D.

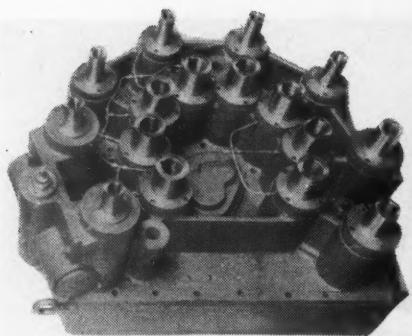
- PRECISION CONSTRUCTION
- BALL BEARINGS THROUGHOUT
- DOUBLE CONE FRICTION CLUTCH
- DOUBLE SPEED REVERSE
- COUNTERBALANCED SPINDLE
- LUG TYPE SPINDLE AVAILABLE FOR EXTERNAL THREADING WITH ACORN DIES
- ALUMINUM HOUSING
- INDIVIDUAL GROUND COLLETS
- NON-GLARE CRYSTAL FINISH
- IMMEDIATE DELIVERY
- STURDY, VIBRATION-FREE

R. G. HASKINS CO. • 620 S. California Ave. • Chicago 12



haskins

PRECISION TAPPING
EQUIPMENT



RETOOLING
FOR GREATER
PRODUCTION
By **BUHR**

**BUILT for SPECIFIC
JOBS BY BUHR**

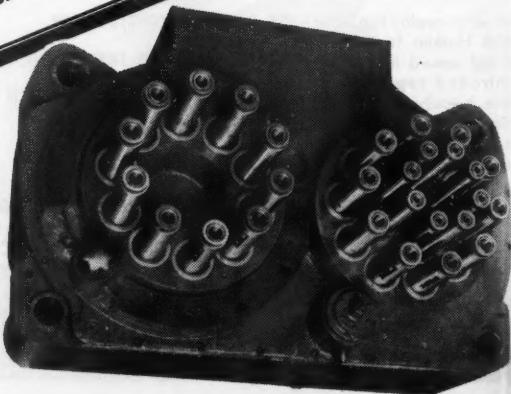
ABOVE—
1—16 Spindle Drilling, Counter-
Boring and Reaming Head. De-
signed for left hand head of 2-way machine. Ream-
ing Spindles have accelerated feed.

BELOW—
28 Spindle Buhr indexing, drilling and reaming head.
Vertical adjustment in spindle to lengthen drills. Oil
pump for positive lubrication. Group of ten spindles
indexes eighteen degrees to countersink holes in
mating part.

Let Buhr Specialists Help With Your Multiple
Spindle Drilling Equipment Designs.

BUHR
MACHINE TOOL
COMPANY

845 Green St.
ANN ARBOR, MICH.





CUTS GRINDING COSTS **29%**

THIS midwest foundry was using heavy-duty, straight type grinders with a speed of 4200 r.p.m., suitable for 8" x 1" x $\frac{1}{8}$ " wheels. Most jobs had hard-to-get-at places and a smaller wheel would reach the job better. The Rotor Application Engineer solved the problem by recommending a higher speed grinder (5600 r.p.m.) and 6" x 1" x $\frac{1}{8}$ " wheels—giving a higher cutting speed and reducing weight of tool and wheel 6 lbs. Result:

Cuts grinding costs 29% because of increased output due to:

1. Higher cutting speed.
2. Easier, faster handling of lighter tool.
3. More time on the job due to less fatigue.

The Rotor Application Engineer will be glad to apply his experience in solving portable tool problems to help you cut your grinding costs.

Yours for more output per man per dollar,

AIR O'TOOL

AIR

HIGH CYCLE

THE ROTOR TOOL CO.

CLEVELAND, OHIO

has
your shop got
the
"TOOL ROOM
TROTS?"

How much time is wasted "on the road" while punch press operators and set-up men go back and forth to the tool room to get punches and dies for a short run set-up?

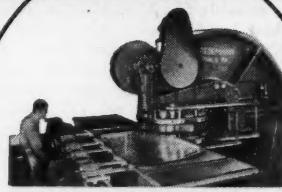
SEE A WIEDEMANN

With a Wiedemann Turret Punch Press, the operator remains at the machine . . . no need to make numerous time consuming "trips," since 11 to 32 punches and dies are carried in the turret . . . ready for instant piercing . . . always at the operator's fingertips. In addition, a Wiedemann saves you hours of layout time. On some machines, layout time is completely eliminated because of material handling gauge tables that position the material ready for piercing by obtaining the X and Y coordinate from blueprints or charts.

WIEDEMANN MACHINE COMPANY

1821 SEDGLEY AVENUE • PHILADELPHIA 32, PENNA.

Send today for the complete story of short run piercing economy . . . Bulletin 92 . . . and then if you'd like to see a Wiedemann in operation, we'll tell you the shop nearest you that does short run piercing with a Wiedemann.



This Type R-7 Turret Punch Press cut production time from over 12 hours to 73 minutes on short run jobs. Get the proof!



Dressing the grinding wheel in exact relationship with the gear.

CROSS
No. 90

CHAMFERS HARDENED GEAR TEETH

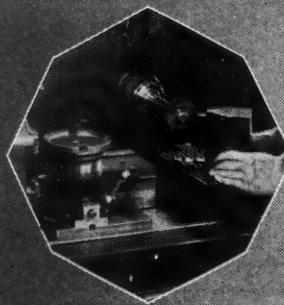
GRIND UNIFORM GEAR CHAMFERS
with the No. 90 CROSS

The No. 90 Cross chamfers hardened gear teeth after the grinding operation, overcoming the difficulty of uneven and poorly-spaced chamfers usually encountered when green chamfered gears distort from heat treatment.

The operating cycle of the No. 90 Cross is entirely automatic. The gear is indexed from its own teeth and, consequently, each tooth is individually located in exact relation with the grinding wheel.

The grinding wheel dresser is an integral part of the machine and the enlarged view shows precision form dressing of the wheel from a master template. The form is automatically dressed in the wheel in exact relationship with the gear so the chamfer locates accurately on the gear teeth without machine adjustment.

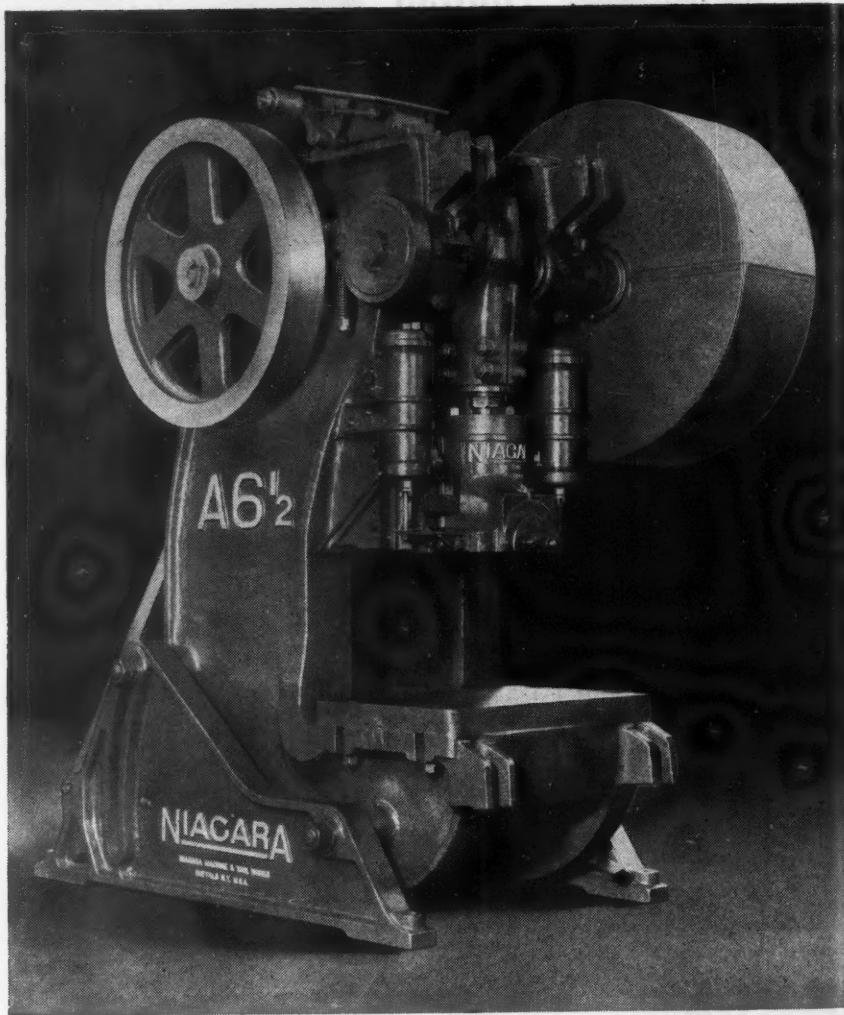
These and many other features indicate the value of this equipment wherever precision gears are manufactured. Write The Cross Company, Detroit 7, Michigan.



CROSS

MACHINE TOOLS

New York • Chicago • DETROIT • Cleveland • Dayton



America's Production is being speeded up by the use of Niagara Open Back Inclinable Presses. The No. A-6½ shown above is one of the complete, well graduated Niagara line ranging from 7 to 190 ton capacities. Their many features contribute to **LONG DIE LIFE AND MORE WORKING STROKES PER HOUR**. Complete specifications are given in Bulletin 58, available upon request. Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices: Cleveland, Detroit, New York.

Below—an inspection bench in the Broaching Department, and in the big illustration—the New Britain Torque Tester at work measuring the toughness of these Tools...actually breaking them under tremendous pressure.



Breaking Perfectly Good **TOOLS** Scientifically

to give you Mechanics Hand Tools that make money

Every day—beautiful, glistening New Britain Tools . . . Tools as fine as any mechanic ever handled . . . are offered up on the high altar of SAFETY—guillotined for your protection! The New Britain Torque Tester shown above is a hard bitten, cold blooded judge of Tool perfection. It registers to the fractional ounce of strain the ultimate capacity of a Tool's ability to "take it." It's the final, positive proof that a New Britain Tool is RIGHT before you put it to work.

New Britain Hand Tools are not alone time and money savers where maintenance is

concerned . . . they're knuckle insurance for mechanics as well. From the time they start as a rough piece of selected alloy steel, they must pass countless tests and inspection after inspection. Every step of their manufacture is controlled, checked and rechecked.

Ask your Mill Supply Jobber to show you the *quality tested* New Britain Line. Every Tool in it has been engineered for the future—they're tomorrow's Tools TODAY! The New Britain Machine Co., New Britain, Conn.

The complete
New Britain Line
for Automotive,
Aircraft, General,
Maintenance and
Production Needs
is sold by leading Jobbers.

New Britain

HAND TOOLS

GREATER STRENGTH - BETTER FIT

YESTERDAY'S PIONEER . . . TODAY'S LEADER



WELDON

GROUND FORM TOOLS

In their extremely close tolerance and general high quality Weldon Ground Form Tools represent the culmination of many years experience in this special field. Weldon is fully equipped to produce form tools in any conceivable shape for all types of equipment necessitating the use of such special tools.

To take advantage of our complete service on this type of tool, from engineering to final production, all you need do is to outline your requirements. We'll do the rest.

Our present facilities insure prompt delivery.

Insist on WELDON TOOLS FOR WELL DONE JOBS.

Write for Catalog 8-B.



THE WELDON TOOL CO.



3000 WOODHILL ROAD

*Cleveland 4,
Ohio*

HOLES IN A HURRY!

DUMORE HIGH SPEED BENCH DRILL

HIGH SPEED MOTOR—
1/30 HP—Universal motor, equipped with self-aligning sleeve bearings, provides speeds from 2,000 to 15,000 R. P. M.

No. 0 JACOBS CHUCK—
provides a capacity for drill sizes from No. 60 to No. 30 drills.

LARGE WORKING AREA—
Three-inch diameter table permits drilling to center of six-inch circle.

UNUSUAL FLEXIBILITY OF ADJUSTMENT—
Movement of work table accurately regulated by adjustable feed stop-nuts.

FULL CONTROL OF SPEED—A foot rheostat controls to vary speeds according to the operation, with both hands free for work.

SMALL — LIGHT — PORTABLE —
only 15 lbs... overall height only 14½" ... can be easily moved wherever needed.

SOLID, STABLE BASE —
Measuring 3" x 8", it insures the stability needed for precision work.

\$52⁵⁰ (Universal Motor
—DC to 60 cycle
AC 115 and 230 volt standard)

Conveniently small, compact, and light in weight, Dumore's High Speed Bench Drill performs scores of precision drilling operations at production pace. Its wide range of speed, full control of speed, adjustable features, and precision construction make it ideal for tool shop or production work within its range. The Dumore Co., Tool Division, Dept. TD33, Racine, Wis.

DUMORE
PRECISION TOOLS

SOLD BY AUTHORIZED
INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

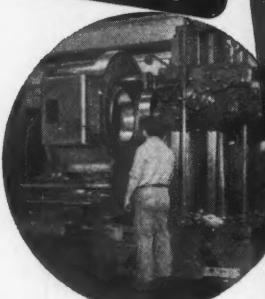
RAILROAD



Railroad shops turn out a greater variety of work on their G. & L. machines in less time than on any other type machine tool. Eight hours were required to mill this locomotive cross head—now it is completed in 30 minutes.

G. & L.

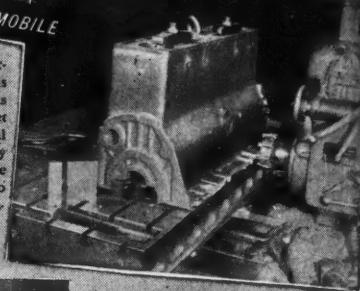
MACHINE TOOL



Machine tool manufacturers recognize the built-in accuracy of the Giddings & Lewis Horizontal Boring Machine. Here a special machine base is being bored using a Continuous Feed Tracing Head. The inner 24" bore has just been completed and held to .0005"

AUTOMOBILE

A truck engine manufacturer successfully used Giddings & Lewis machines to produce blocks until a production line was set up. Now the G. & L. Horizontal Boring Machines are profitably used to complete a wide range of work ordinarily routed to several single purpose machines.



SHIP BUILDING



G. & L. Table Type Machine

G. & L. Floor Type Machine

G. & L. Planer Type Machine



G. & L. Multiple Head Type Machine

GIDDINGS & LEWIS MACHINE TOOL CO.

SPEEDS PRODUCTION... LOWERS MACHINING COST THROUGHOUT 8 MAJOR INDUSTRIES



The huge variety of **heavy industrial equipment parts** which can be handled on a Giddings & Lewis is typified by this large shovel base. The open construction of the G. & L. machine makes it possible to do operations impossible or impractical on other machines.

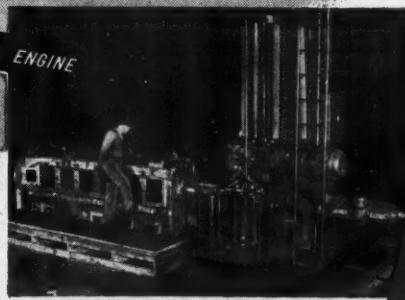


TOOL DIE and FIXTURE MFG.

Machining this frame for an oil field pump is an ordinary job for a G. & L. Horizontal Boring Machine. Machine scales and verniers are used exclusively to locate all through bores and cross bores.

Jigs, fixtures, tools and dies are made in less time when they don't have to be reset for subsequent operations. The machining time on this forging die was cut from 300 hours to 100 hours.

MARINE and DIESEL ENGINE



IMPORTANT
MACHINING
INFORMATION
is available on G. & L.
machines and should
use in industry. Write
for this FREE pamphlet
since data today will
be tomorrow's standard.

146 Doty Street • Fond du Lac, Wis.



...with



Chipping Hammers

The three factors that you must watch on your chipping jobs are the amount of metal removed, the time required to remove it, and the cost of removing the metal.

First: The amount of metal removed depends upon the selection of the right chipping hammer for the job. For your selection our complete line includes four different types and many sizes.

Second: The time required to remove the metal is important. Chipping hammers lead a rugged life, and their cutting efficiency may take a terrific drop if certain factors are not watched and checked periodically. Our engineers are specially trained in the proper operating and maintenance

techniques required to give you the highest degree of chipping hammer "cutting efficiency."

Third: The cost of removing the metal involves factors one and two as well as several others, such as—correct air pressure at the tool—efficient layout—correct chisel shapes—standard tests for "cutting efficiency," etc.

They all sum up to the fact that I-R hammers and I-R "cutting efficiency service" can produce the results you need to turn out more and better jobs. Call our nearest office. Our engineers are ready to help you. Also yours for the asking is a two-color wall chart on chipping hammer repairs, Form 5634. Send for a copy now.

CHIPPERS • DRILLS • GRINDERS
RIVETERS • WRENCHES • HOISTS

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

B-832

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STARRETT TOOLS

*Set the Standard
for Quality Control*

Let safe, dependable Starrett Precision Tools handle those extra production inspection operations that make the difference between a final OK and a reject. Made by master toolmakers — by men who know how to make good tools—they combine unfailing accuracy with convenient design to produce precision work with ease and efficiency.

THE L. S. STARRETT CO. • ATHOL, • MASSACHUSETTS • U.S.A.
World's Greatest Toolmakers

**SEE THE
STARRETT EXHIBIT**

You'll find a cordial welcome and an interesting display waiting for you at the Starrett Exhibit. Be sure to visit . . .

**Booths 213-215
A.S.T.E. EXHIBITION.**

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

- ✓ HOLD COSTS DOWN
 - ✓ KEEP PRODUCTION UP
 - ✓ HOLD TOLERANCES CLOSE
- WITH *Anker-Holth*

Anker-Holth

AIR and HYDRAULIC DEVICES



also offers a complete line of *Hydraulic Cylinders*—non-rotating and rotating.

AIRGRIP

Complete Information and Quotations Upon Request

Anker-Holth Mfg. Co. 2731 Connors St., Port Huron, Mich.

Representatives in all Principal Cities

1627

When buying new lathes, specify "AIRGRIP" Chucks and Cylinders



Announcing 3 New Monarchs-

THE UNI-MATIC

THE MONA-MATIC

THE SPEED-MATIC

Monarch's answers to the problem of how to meet rising production costs:

- For chucking and fixture work—
The Uni-Matic
- For between-centers work—
The Mona-Matic
- For hand-screw bar work—
The Speed-Matic

Each is unique—each is a radical improvement over conventional turning methods. You'll find brief information on the following pages. Let us show you how they'll give you increased production at lower cost, no matter how small your lot sizes. For complete specifications call your nearest Monarch representative—or write us direct.

THE MONARCH MACHINE TOOL CO.
Sidney, Ohio


Monarch
TURNING MACHINES

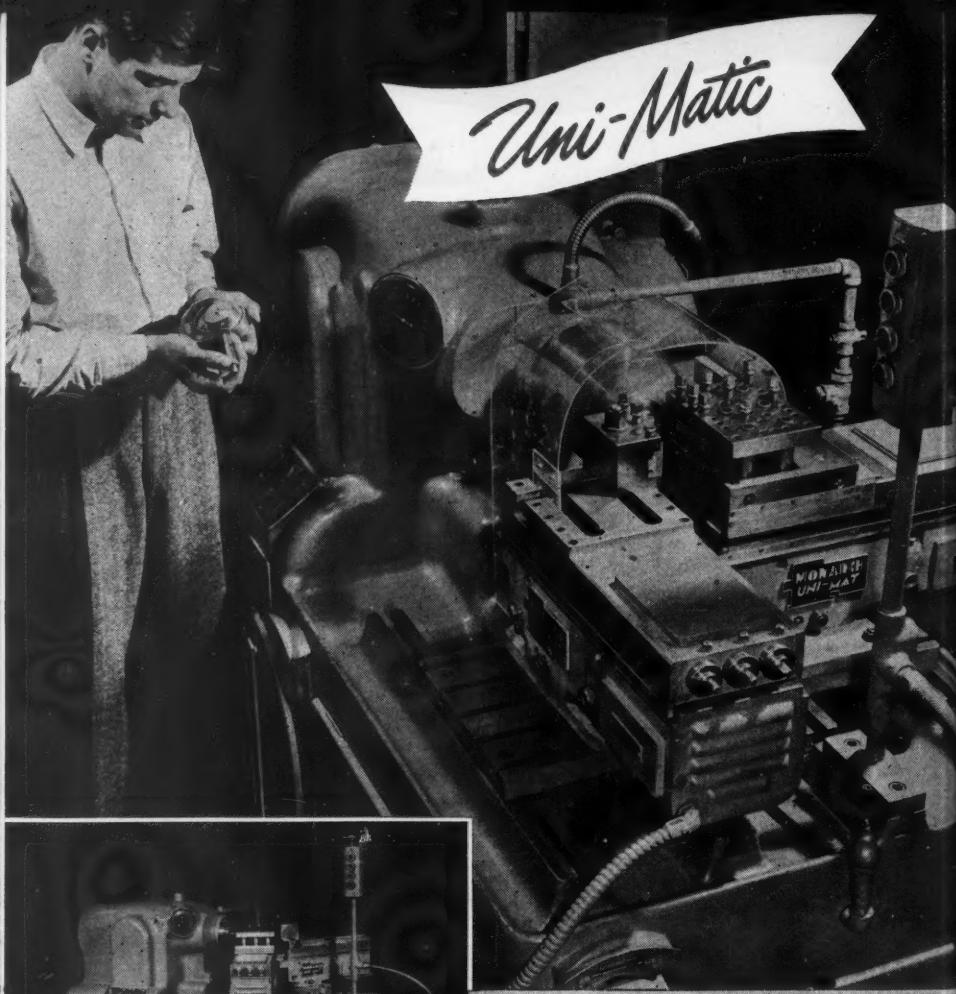
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1627

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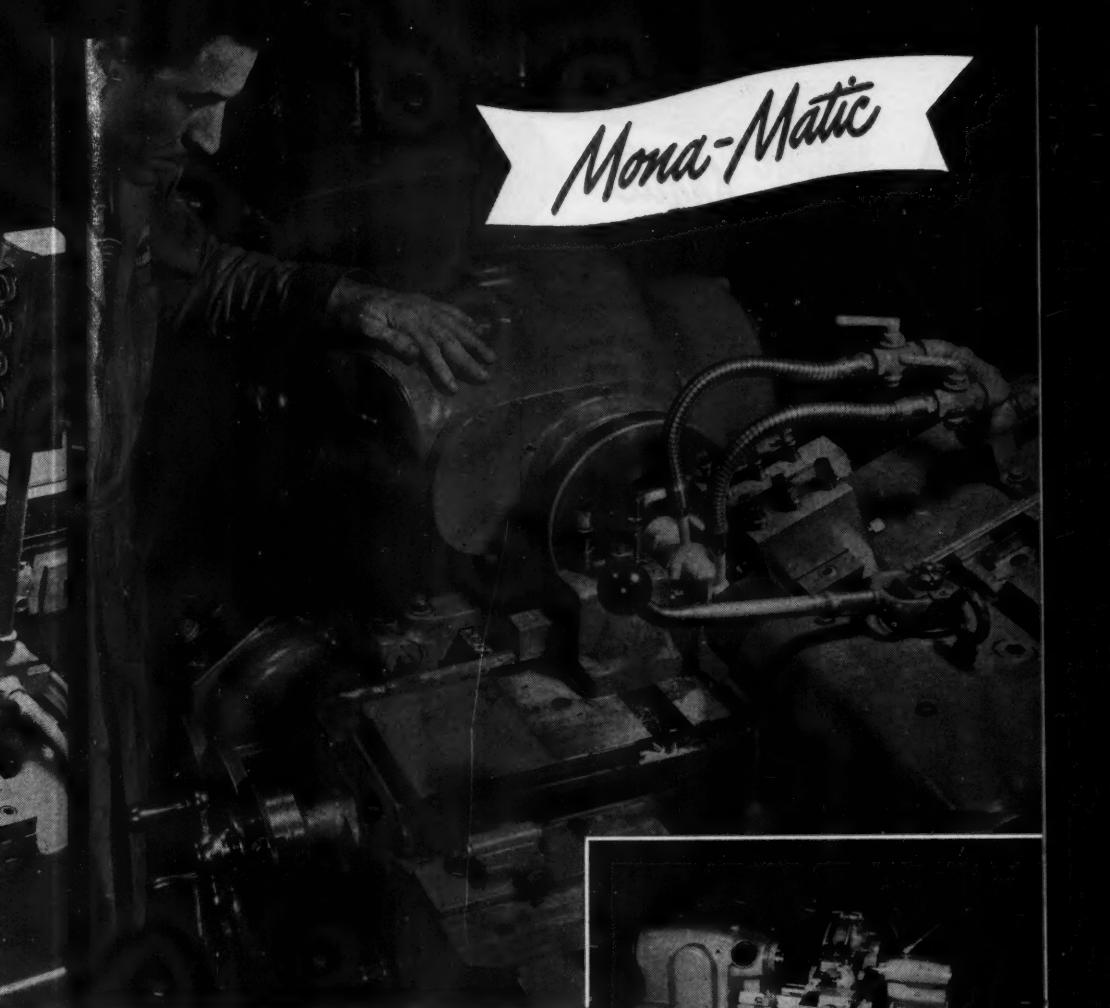


An automatic turning machine for chucking and fixture work—combines high production and extreme accuracy on turning, boring and facing operations. Broad range of spindle speeds up to 1000, 2000, 3000 and even 5000 rpm. Completely independent, electronically controlled action of each interchangeable Uni-Mat (a motor-driven tool slide) permits universal positioning as well as universal tooling. Feed range $\frac{1}{2}$ " to 13" per minute, with rapid traverse of 100" per minute. Suitable for work as small as 1" and as large as 16" diameter.



Monarch
TURNING MACHINES

THE MONARCH MACHINE TOOL CO. - SIDNEY, OHIO



Mona-Matic

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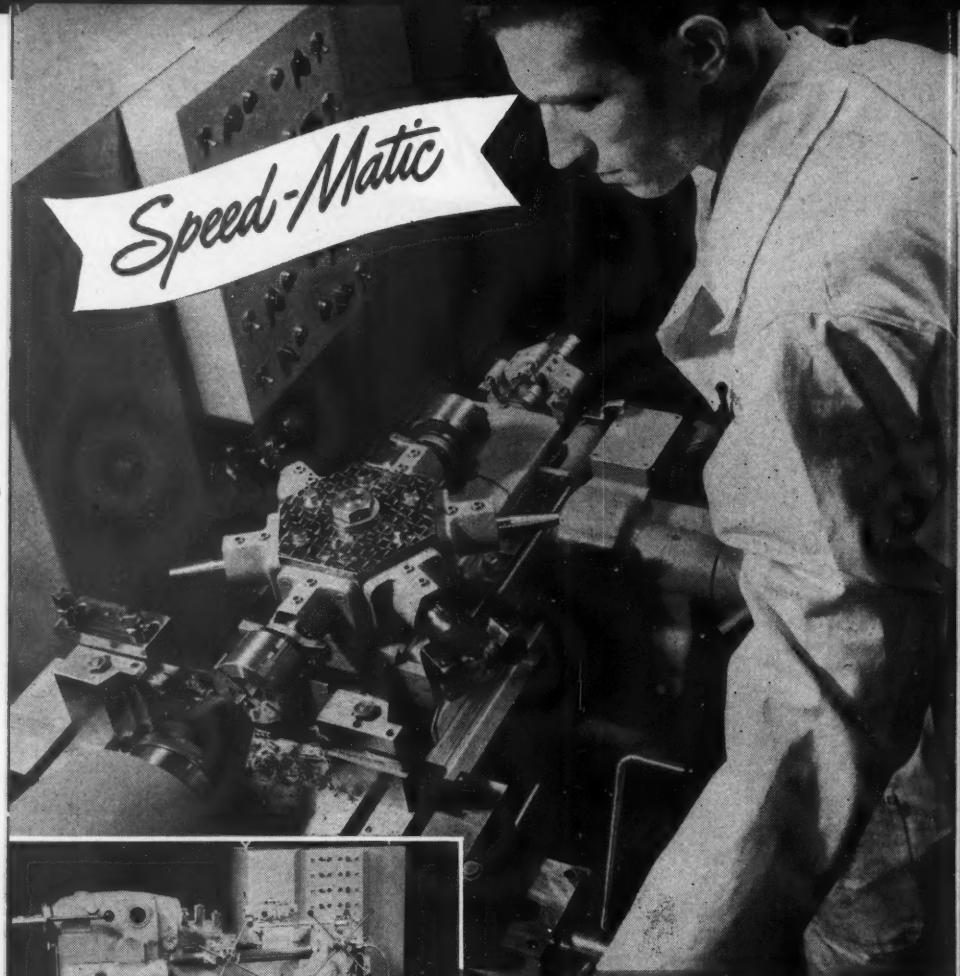
An automatic turning machine for between-centers work, offering the same degree of high production and extreme accuracy as the Uni-Matic. Complete range of spindle speeds up to 1000, 2000, 3000 and even 5000 rpm. May be operated fully automatic, fully manual or in any combination. Power feed and rapid traverse return on front carriage; rear carriage may be added as separate unit. Swing over bed—15"; swing over front slide—9"; over rear slide—7½"; travel of front slide—4"; rear slide—3½".



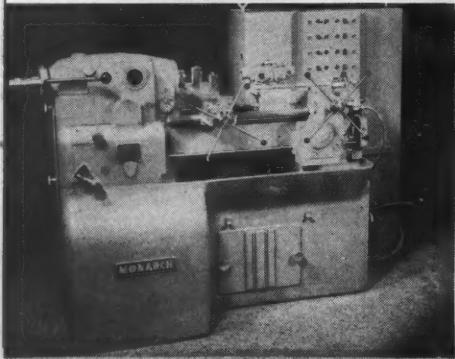
THE MONARCH MACHINE TOOL CO. • SIDNEY, OHIO



Monarch
TURNING MACHINES



Speed-Matic



A high production hand screw machine with power feed ram type turret, hand operated cut-off slide and preselected changeable spindle speeds—from 50 to 5000 rpm. Designed for maximum high production with extreme accuracy on lots of 25 to 500 or higher. Automatic electronic speed change through as many as ten stations insures using most efficient cutting speed for each operation. Feeds from .0005" to .016" per revolution. Collet chuck capacity $\frac{3}{8}$ ".



THE MONARCH MACHINE TOOL CO. • SIDNEY, OHIO

Engineered Hole Location Service Speeds

New Dies to Your Pressroom

BRINGS INTERCHANGEABILITY TO TOOLMAKING

Die, stripper and punch plates of complex tools and dies can now be produced *concurrently* by several toolmakers on an interchangeable parts-and-assembly basis instead of progressively as a one-man job.

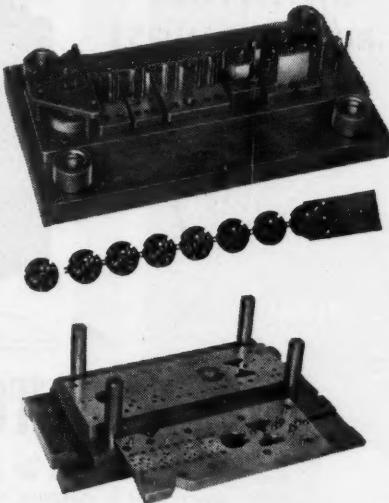
Yes, mass-die production is now possible, with the Moore Jig Borer and Moore Jig Grinder working together as tool room partners.

Take this 10-station hardened progressive die, with 100 holes to be located, bored and ground to .0002" tolerance in the die and stripper inserts. Using old methods, this would require about 2,000 man hours and six months to complete.

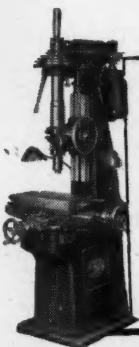
With the Moore Jig Borer and Moore Jig Grinder working to pre-engineered dimensions, all parts of the die were manufactured to figures instead of to "fit"... bored and ground in single set-ups on each machine. The diemaker merely assembled the parts.

Total man hours: 1,000, Delivery: 5 to 6 weeks

Mass-die production lowers tool costs, increases tool-room capacity, prolongs tool life and extends the ratio of productivity of operator and machine. One of our engineers will show you how Moore Engineered Hole Location fits your production scheme.



All holes are pierced and shaved,
contour gutted and shaved.



HOW MOORE JIG BORER AND MOORE JIG GRINDER PROMOTE INTERCHANGEABILITY IN THE TOOLROOM

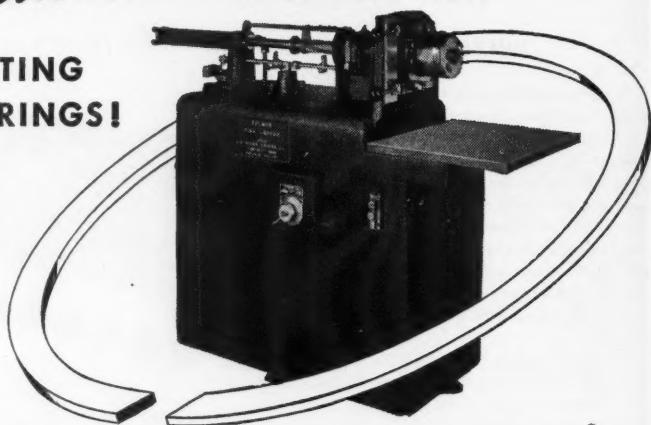
1. *Moore Jig Borer spots, drills, bores or reams all holes with minimum tool changes.*
2. *Moore Jig Grinder relocates holes in hardened parts by finish-grinding.*
3. *Accurate Lead Screw Measuring Principle in both machines assures precise, rapid table settings within .0001" by coordinate location.*
4. *Coordinate calculations made by engineering department are used throughout in boring and finish-grinding to figures instead of to "fit."*
5. *Soft and hardened parts are made concurrently, not progressively. Errors in hardened parts are corrected, not retained and transferred to other parts.*
6. *Both machines inspect own work without disturbing set-up.*



MOORE JIG BORER  **MOORE JIG GRINDER**
MOORE SPECIAL TOOL COMPANY, INC., • 730 UNION AVENUE, BRIDGEPORT 7, CONN.

Eliminate Guesswork

**IN FITTING
PISTON RINGS!**



FULMER PISTON RING LAPPER

Only 10 to 25 strokes of the Fulmer Piston Ring Lapper will assure 100% contact of piston rings with the cylinder walls! There is no guesswork as to how rings fit the cylinders—you can see that they have a perfect bearing, *before the engine is built up!*

The Fulmer Piston Ring Lapper reduces "run-in" time from many hours to just a few minutes. It eliminates the need of tearing down engines because rings do not "seat" properly. It assures peak performance from engines, pumps and compressors, with longer operating life between overhauls. *Write Today for Complete Information*

C. ALLEN FULMER COMPANY

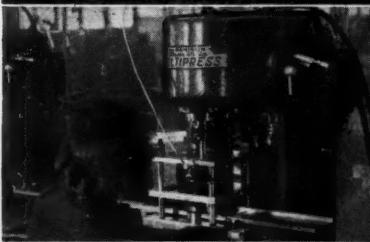
1233 First National Bank Bldg., Cincinnati 2, Ohio

FULMER
PRECISION PRODUCTION EQUIPMENT

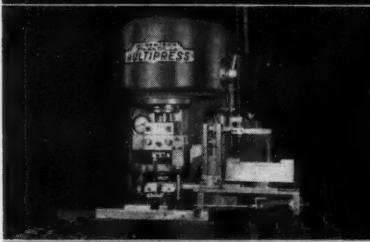
ROD BORERS
HONING MACHINES
PISTON RING LAPERS
CENTRIFUGAL CASTING MACHINES

DEALERS: A few attractive territories remain open. Write today!

DEEP-DRAWING



PUNCHING



TRIMMING



MOULDING



ASSEMBLING



MULTIPRESS

**offers on-the-job proof
of low cost efficiency
on scores of operations**

**COMPACT
POWERFUL
VERSATILE
ACCURATE**



Proof continues to pour in from the production lines that MULTIPRESS offers a new and better way to speed out . . . cut costs . . . reduce maintenance and tooling "on time" . . . lower fatigue and increase safety for operators . . . make drastic savings in floor space . . . minimize noise . . . improve quality and cut down on rejects—and so on through dozens of important production advantages! MULTIPRESS packs 4, 6 or 8 tons of smooth hydraulic power into amazingly compact, space-size units. Ingeniously engineered to accept an unusually wide range of controls, tools and fixtures, it offers operating versatility never before equalled in the entire tool field.



units feature ram pressures regulative from 300 pounds to capacity, and ram strokes adjustable from $1/32"$ to capacity. Standard MULTIPRESS accessories include benches, side shelves, extension tables, a variety of bolster plates, straightening fixtures, indexing tables, automatic cycling controls, and the revolutionary new Vibratory Ram Action! Write today for details.

**The DENISON
Engineering Company**
1153 Dublin Rd., Columbus 16, O.



DENISON
EQUIPMENT & APPLIED
HydroOiles

You Can Make Modern Steel

Like This



by automatically
welding units like these

At Low Cost

with FEDERAL WELDERS like



Nearly three hundred different "steelware" items are processed, in one or more stages, on the Federal PATM-3 250 KVA welder shown at right, and a Federal PA-2 150 KVA machine with which it is teamed, at the plant of General Steel Wares Ltd., Toronto. Some fifty sets of dies, designed to be usable in hundreds of combinations, help to solve this company's problem of manufacturing an all-embracing variety of quality metal merchandise in "semi-mass" lots.

For nearly ten years these same Federal welders have projection welded spouts on percolators, bail tabs on teakettles, handles on double boilers and roasters, have spot welded many shapes and performed hundreds of other low-cost operations. Illustrations of a few regular items above only partially indicate the wide variety of shapes these welders have handled continuously since 1937.

THE *Federal*

SUBSIDIARIES
Gandy and Adams Co., Cleveland—SPECIAL HIGH PRECISION MACHINES

MACHINE AN

el ware

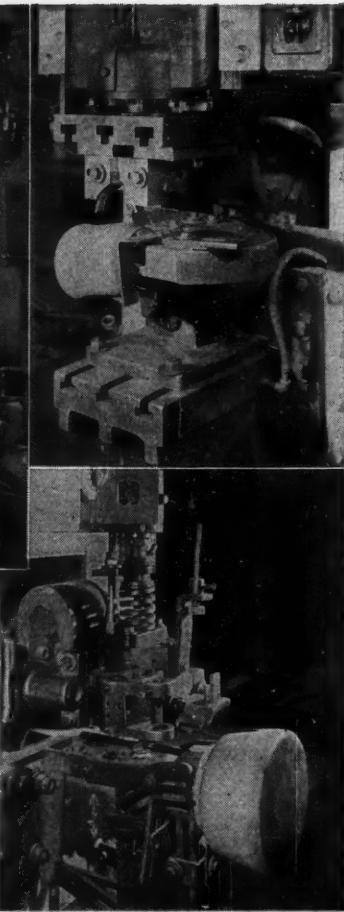


This Federal PATM-3 Press Tube Welder is projection welding handles on percolators at the rate of about 500 per hour. (See fixture upper right). Previous operation, on a companion Federal, attached the spouts.

ALL PICTURES—Courtesy General Steel Wares Ltd., Toronto, Ont.

Whether you make houseware or houses, toys or tractors, you are today faced with certain increasing costs . . . It is important that you investigate possible applications of Federal Resistance Welders to assure utmost efficiency in YOUR processing.

Federal makes every variety of resistance welder . . . Spot, projection, seam, roll spot, flash or portable gun types . . . Federal engineers also design machinery combining the features needed to fit special needs. To attain maximum metal fabricating efficiency, employ Resistance Welding. To get the most from Resistance Welding . . . be sure it's by FEDERAL.



Above—This fixture can be adjusted to fit more than one size of handle. The Federal resilient head, combined with air-operation, assures smooth operation, fast follow-up.

Below—Parts of this fixture are adaptable to other operations, other shapes. Here, tabs for tea-kettle bail are projection welded to body. Change-over to setup for attaching spouts takes but a few minutes.

AND WELDER COMPANY

14 DAVIS STREET, WANTED, SALES

30 YEARS OF CONTINUAL IMPROVEMENT

...Results Speak for Themselves...



Recent photograph of an Axelson Lathe, manufactured in 1915, still in operation in the maintenance department of a Los Angeles heavy industry.



Axelson Lathes of various lengths are manufactured in 14, 16, 18, 20, 25 and 32 inch sizes.

TODAY'S GREAT LATHE

Pictured above is today's truly great Axelson heavy duty Lathe, the product of more than thirty years of diligent determination to make this a quality machine tool. Quality determined by durability through advanced metallurgy. Quality developed by skilled and enterprising engineering. Quality proved by versatile, fast, close tolerance work on all jobs, big or little. Jobs that pay off by low production cost.

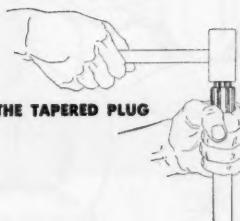
AXELSON LATHES

Dependable for over
a Quarter Century



AXELSON MANUFACTURING COMPANY
6160 S. Boyle Ave., (Box 98, Vernon Station), Los Angeles 11, Calif.
50 Church St., New York City 7 • 3844 Walsh St., St. Louis 16, Mo.

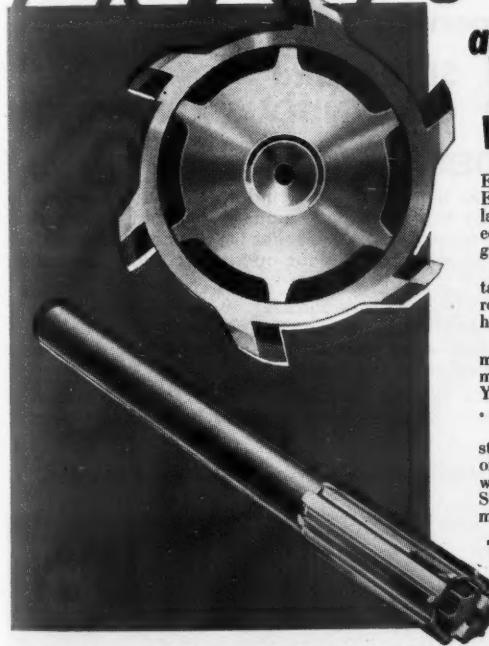
TO EXPAND . . .
JUST DRIVE IN THE TAPERED PLUG



Staples

CARBOLOY-TIPPED EXPANSION REAMERS

P R E C I S I O N . . .



**again and again
and again—
WITHOUT REGRINDING**

Expand the solid body of a Staples *exclusive* Expansion Reamer. Tilt back the diamond-lapped Carbolyt Cemented Carbide cutting edges. Do this again and again, without regrinding . . . and get precision every time.

Instead of regrinding, simply drive in the tapered plug and increase the diameter of the reamer to compensate for the amount that has worn.

The patented Staples Expansion Reamer is made with a one-piece body—not split. This means rigidity—and rigidity means precision. Your results are finer finish, longer tool life . . . real economy.

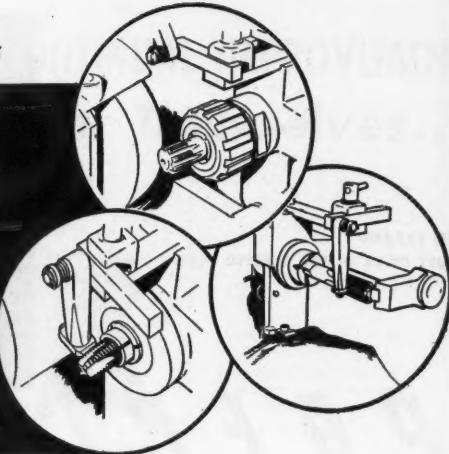
This exceptional tool met the exacting standards of wartime construction. It is one of a line of quality circular cutting tools used wherever very close tolerances are held. Standard tools in stock for immediate shipment. Special tools designed.

The Staples Tool Company
Cincinnati 25, Ohio

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS • CORE DRILLS • SPOT FACERS • COUNTERBORES • END MILLS •
SHELL END MILLS • ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

Model No. 1 for taps up to 6" long
Model No. 2 for taps up to 14" long



ACCURATE Tap Sharpening

with only — { 1 SETUP and
1 CONTINUOUS OPERATION

THE BLAKE TAP GRINDER

Accurate sharpening of your dull taps is quickly and profitably accomplished on the Blake Tap Grinder. The unique eccentric movement of the workhead allows the tap to be continuously revolved while being ground. This results in both the chamfer angle and the relief (of all the cutting edges) being ground at the same time, in one rapid, continuous operation. Only the initial, quickly-made setup is required.

With the Blake you can sharpen taps with any chamfer angle you may wish... with any amount of relief... right- and left-hand taps... taps with 2, 3, 4, 5, 6, 8 or 10 flutes... from size No. 0 to 2" dia.—also countersinks, 3- and 4-flute drills, step drills and many other tools requiring relief on the point.

It will pay you to investigate this speedy, exclusive and profitable method of greatly prolonging the life of your taps. Send the coupon today for complete details, without obligation.

No machine is better than the cutting edge of the tool it uses.

Please send me Bulletin 544 which gives complete details on Blake Tap Grinders. MMS

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

EDWARD BLAKE CO.
634 COMMONWEALTH AVE.
NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS — FILTAIRE PORTABLE DUST COLLECTORS — AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — WALTHAM CUTTER SHARPENERS — HAGER CARBIDE TOOL GRINDERS

Saw More

METAL CUTTING MACHINES

THE MOST
FOR YOUR MONEY
IN
METAL-CUTTING



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Completely
Automatic—Constant
Mesh, 4 Speed Transmission—
Angular Cutting Without Moving
Stock—Self Aligning Saw Frame—
6 x 6 or 10 x 10 Capacities.

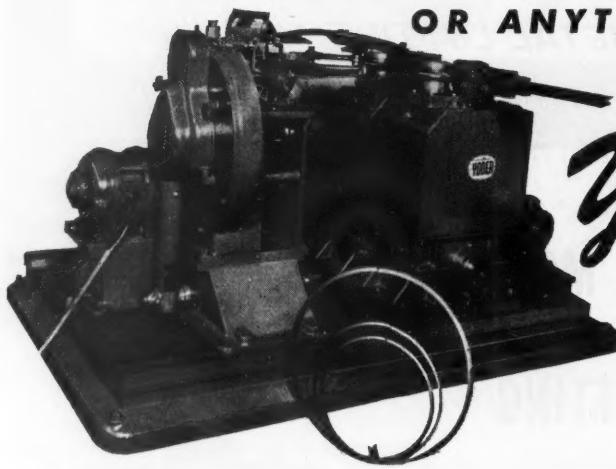
Write for Details.

MAQUOKETA COMPANY

Maquoketa, Iowa

MAKING BIKES OR BARRELS, TUBS OR TRANSOMS?

OR ANYTHING ELSE
OF METAL
THIS



Yoder
MACHINE

is typical of the practical-but-not-ordinary machinery in which the Yoder Company specializes. It forms rings in a variety of sections from flat stock, or straightens and coils round stock . . . Cuts rings to size; clean finish, accurate alignment (ready for welding if desired). Infinite sizes from headlight rims to barrel rings. Speed and economy in keeping with today's production demands.

Other Yoder machines coil, uncoil, slit, form and cut off all types and weights of strip or sheet metal to make everything from simple moulding to intricate sections for steel sash or wide roofing sheets.

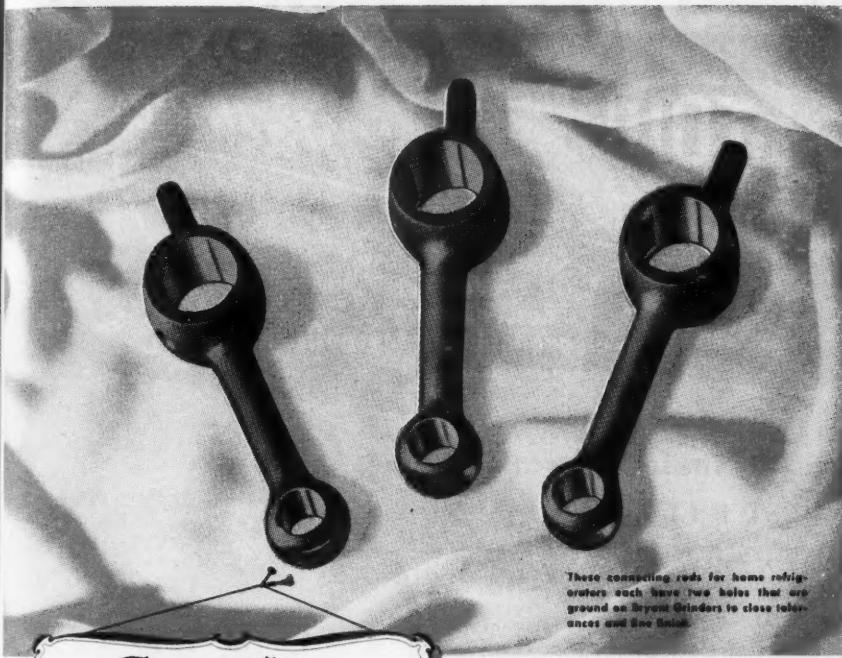
There are many more . . . Get Bulletin G-451 describing them.



The
YODER COMPANY
METAL WORKING PRODUCTION MACHINERY

5532 Walworth Ave.

Cleveland 2, Ohio



These connecting rods for home refrigerators each have two holes that are ground on Bryant Grinders to close tolerances and fine finish.

Specialists
in
Forged Steel Jewelry

No, we don't sell it; we don't make it, but we do build internal grinding machines that make it. The three connecting rods for home refrigerators, shown above, are typical examples of the type of work that is ground on Bryant Internal Grinders. They are truly jewel-like in their finish, but that is not enough—to be sure, Bryant Grinders produce metal parts that have surfaces finished correctly to millionths of an inch, when desired, but Bryant machines also produce these same parts with holes that are truly round and straight. These are basic elements that Bryant insists upon to assure Bryant users that their parts and products will last for years without mechanical failure.

WE KNOW YOUR PROBLEM IS DIFFERENT . . .

. . . practically every internal grinding problem is different. But when you require extreme accuracy or high production, or both, your first step should be to study your problem with a man who makes it his business to solve them. Your first step should be to—Send for the Man from Bryant!

BRYANT



BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.

STOW

Flexible Shaft Machine

Cuts Labor Costs!
Cuts Production Time!
Lessens Fatigue!
Power available in any position!

On All These Operations

**DRILLING
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Also . . .

**Grinding, Buffing, Wire
Brushing, Filing!**



ONE Portable STOW Mobile Power Unit supplies convenient, plug-in power wherever you need it to accomplish all these operations! Interchangeable heads and attachments fit this one machine for lower-cost operation on many jobs. Less operator fatigue. The tool comes to the job. Remote connected power unit makes the working end easy to handle. It's a high-performance unit with shop-wide utility! It will pay its way in any plant—big or little.

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Look for these EXCLUSIVE Features:

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- Positive Locking Guaranteed.
- Work Rests Parallel with Machine.
- Straight-Through Drilling.
- Long Range Loading and Unloading Capacity.
- Hardened and Ground Bars and Locking Mechanism.
- Costs Little More than Common Drill Press Vises.

The amazing new Heinrich "Grip-Master" is a SCREWLESS vise. It represents the most revolutionary development in a century of vise manufacture. The Heinrich "Grip-Master" operates effortlessly . . . the movable jaw is adjusted in a jiffy . . . and is locked securely with a press on the locking lever. Bars and locking mechanism are hardened and precision ground. Wide clearance between jaw guides permits drilling through the work. Removable V-jaw accessory makes drilling of round pieces easy. Four sizes fill every need. When you first see the "Grip-Master," you won't be able to resist trying it. Once you have tried it, you'll not be satisfied until you own it.

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A postal card request will bring you an illustrated folder giving further details about the new Heinrich "Grip-Master". Investigate this new discovery today!



NATIONAL MACHINE TOOL CO. **Dept. 116 D** RACINE, WIS.



THREAD ROLLS . . . now available with
Sossner's sensational new

Mirror - Finish

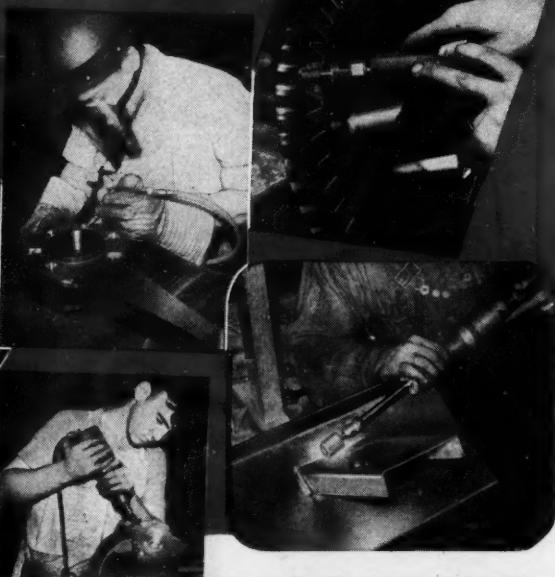
These new Sossner Thread Rolls are ground from the solid high speed stock, specially heat treated for hardness, then specially processed to achieve their unique Mirror-Finish. Send us your specifications for estimate. FAST DELIVERIES ASSURED

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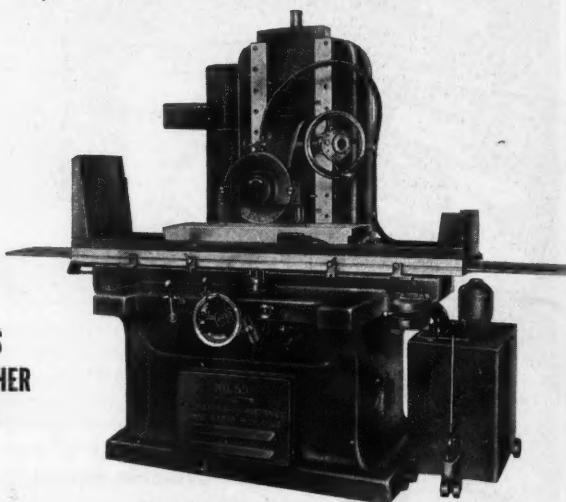
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BUILT IN MANY SIZES
FINER—FASTER—SMOOTHER
THEY PAY DIVIDENDS



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12" x 17" x 36"

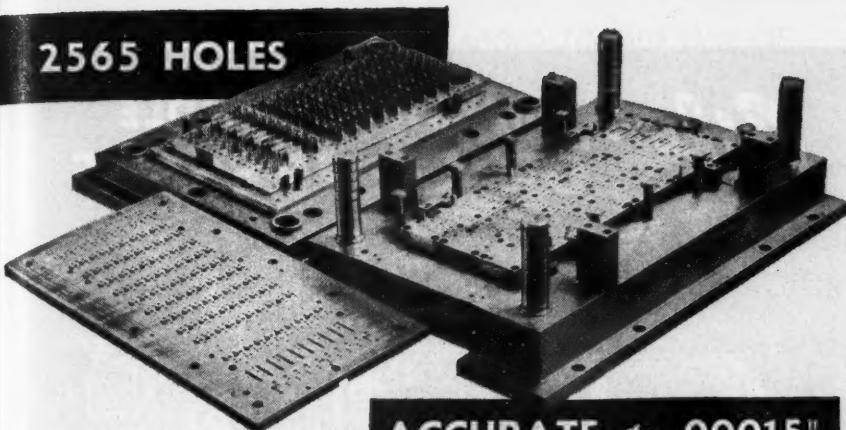
*Full Description
IN BULLETIN GL-101*

GALLMEYER & LIVINGSTON CO.

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GRAND RAPIDS 4 MICHIGAN

2565 HOLES



ACCURATE to .00015"

-try and match this  precision
on your machine!

A SIP Jig Borer is used for this exacting job—drilling 2565 accurately spaced holes in a die, punch and stripper plate . . . And the SIP Jig Borer checks its own accuracy, for this machine is in itself a basic measuring instrument, a standard of precision to which all other shop measurements can be related. The built-in micrometer heads give direct readings to 0.00005". By using the system of rectangular coordinates, work can be set up and holes located without any preliminary laying out. Time wasted using separate measuring instruments, or making involved calculations, or checking results is entirely eliminated. Can you match this speed and precision with your present jig boring equipment?

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Be sure to see our exhibit at the A.S.T.E. Exposition, Cleveland, April 8-12.

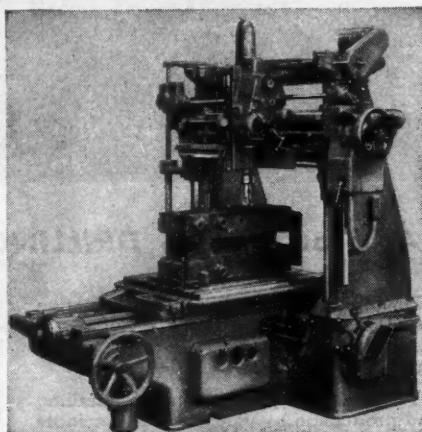
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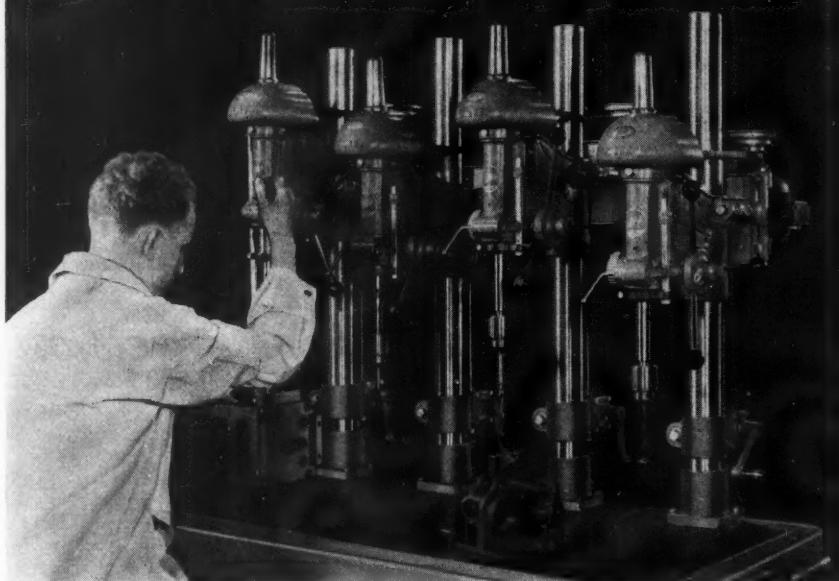
CHRYSLER BUILDING
New York 17, New York



RANGE OF TABLE SIZES

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SAVE on SERIES DRILLING and TAPPING

For big savings and greater production speed, install *Atlas* Multiple Spindle Drill Presses to handle series of drilling and tapping operations.

You save many man hours on handling and production by using 2, 3, or 4-spindle set-ups in combination with jigs and fixtures.

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SMALL-PARTS MACHINING



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MILLING MACHINES

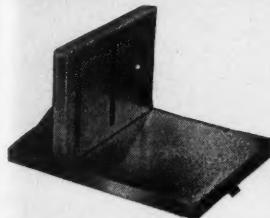


SHAPERS

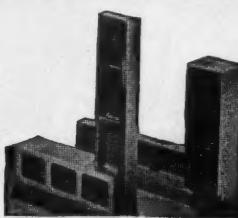


DRILL PRESSES

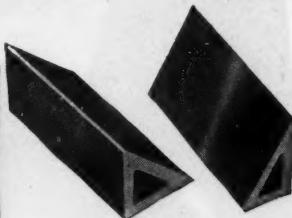
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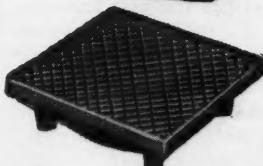
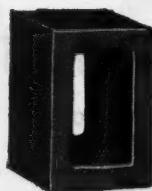
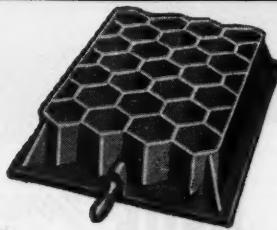
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Carbide Tipped and High Speed Steel



TODAY, lowering production cost is a basic necessity for profitable manufacturing. It is here that Midwest's experience, facilities and engineering ability can assist you in selecting metal cutting tools to reduce your production costs. Midwest has been designing and manufacturing standard as well as highly-engineered, special application cutting tools for 35 years.

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Hy-Pressure Lock
Inserted Blade
Cutter Bulletin 1144

Midwest Tool

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MANHATTAN RUBBER DIVISION
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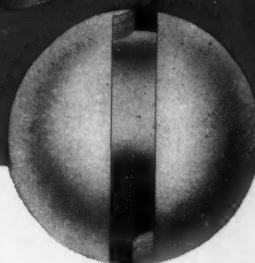
What You Can Do with the **DuBo^{*} Gage**



SINGLE END
Sizes 1.510" to 6.010"
(38 to 152 mm)

DOUBLE END
Sizes .240" to 1.510"
(6 to 38 mm)

Gaging Surfaces are
portions of a sphere



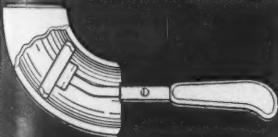
First

You can check plain,
ordinary holes . . .

faster because the DuBo Gage is light, easy to enter (no pilot necessary).

better because you can check dimensional deviations such as taper and out-of-round.

GOES AROUND CORNERS



With the DuBo Gage you can even check around corners. Illustration shows a DuBo Gage with specially shaped shank for checking I.D. of an hour at any point.

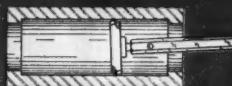
→
Taper enlarging away from the centering can be detected with DuBo Gage without removing part from the machine.

WRITE FOR BULLETIN

*Patents
Pending

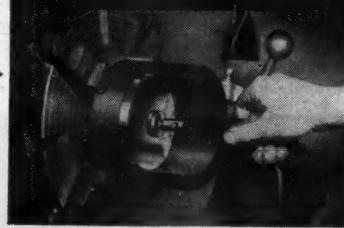
And

GETS BY CONSTRICtIONS



You can do other things with the DuBo Gage that you can't even begin to do with a cylindrical plug gage.

DETECTS BACK TAPER

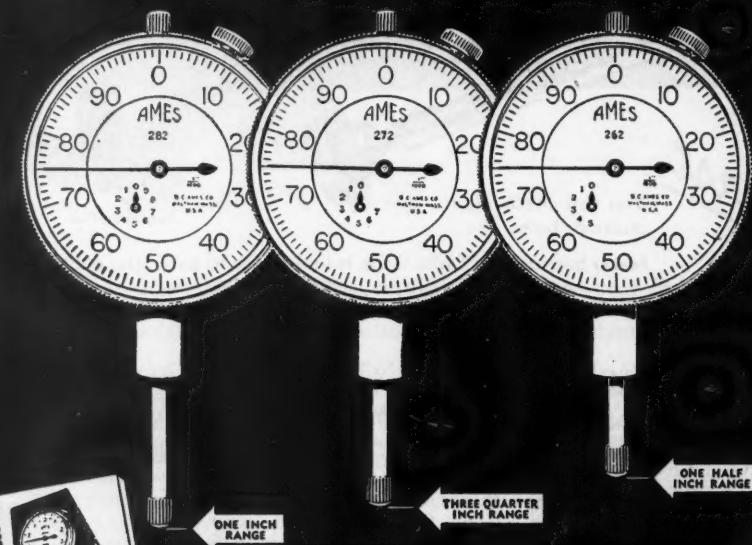


Diameter of entrance of this bore is, by design, .005" to .008" less than central section which is to be checked. DuBo Gage can be entered through constricted opening, and larger diameter can be checked with ease.

Send us your bore checking problem for engineering review and recommendation.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

AMES Long Range DIAL INDICATORS



These Ames Long Range Hundred Series Indicators are desirable when testing long tapers, in extensometer and geo-physical work, or whenever greater range of spindle travel is required.

Graduated to .001", Range: .500"—.750"—1.000". Made in three Hundred Series Indicator sizes—in three dial graduations.

Long Range Indicators have double dials. Outer dial turns with bezel over inner stationary dial. Small hand indicates turns of large hand.

Write to-day for the new Ames Catalog No. 53.

B. C. AMES CO., WALTHAM, MASS., U. S. A.

BRANCH OFFICES: NEW CENTER BLDG., DETROIT 2, MICH., 420 LEXINGTON AVE., NEW YORK 11, N. Y.

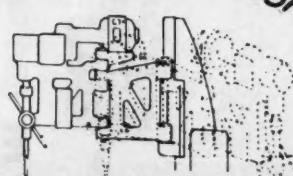
or miscellaneous
drilling and
tapping

HERE is a machine designed to perform light drilling and tapping operations at high speed with a minimum of effort. The unique hinged arm construction makes it possible to move the drill or tap quickly with a single motion to any position over the work, thus reducing the time required to move from hole to hole. Any one of six spindle speeds may be quickly selected and tapping reverse is always instantly available without any adjustments to the machine. It makes an excellent choice for miscellaneous work on a large layout of varying size holes.

THE FOOTE-BURT COMPANY
CLEVELAND 8, OHIO
Detroit Office: General Motors Bldg.



SWINGS TO ANY POSITION



FOOTBURT-HAMMOND
Radial Drilling Machines

THEY SATISFY THE ACCURACY DEMANDED IN ANY PRODUCTION JOB

Ettco-Emrick Tapping Attachments are not makeshifts. They are precision-built units which, when mounted on your drill presses, satisfy the exacting demands of any production job. Exclusive features . . . the result of over a quarter of a century of engineering research and manufacture . . . assure their

**Ettco-Emrick
TAPPING
ATTACHMENTS**

accuracy. Furthermore, Ettco-Emrick Tapping Attachments do not require specially skilled operators. With them, ordinary operators — men or women — can turn out accurate work at high production rates. Every shop having tapping operations within the range of No. 0 to 1" taps can profitably use Ettco-Emrick Tapping Attachments.

MADE IN 7 SIZES
FOR No. 0 TO 1" TAPS



WRITE FOR BULLETIN No. 2

Here are the exclusive features described in Bulletin No. 2 which give Ettco-Emrick attachments the accuracy demanded in all tapping operations:

- Sensitive friction clutch
- Automatic reverse
- Quiet helical gears
- Tap idling in cutting direction
- Ball bearing main spindle
- Needle bearings on intermediate shafts

QUILL CLAMPS are available for absolute rigidity. Send for Bulletin No. 2 today.

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Over 25 years specialization in solving industrial drilling and tapping problems

WITH CUTTERS
**IT'S PRODUCTION
THAT COUNTS —**

**... and Brown & Sharpe Cutters are outstanding for
the High Production they deliver . . . with minimum
sharpenings . . . and long cutter life.**

Brown & Sharpe designs, selected materials, scientific heat treatment and broad experience in cutter manufacture all contribute to the superior performance of Brown & Sharpe Cutters.

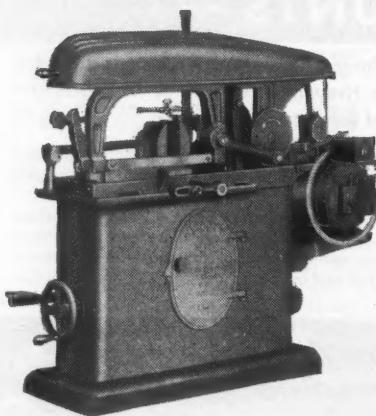
Fast machining rates . . . minimum sharpenings . . . accuracy where accuracy is essential . . . long cutter life . . . these are advantages Brown & Sharpe Cutters give you—advantages that count—in production.

Catalog listing complete line sent on request. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

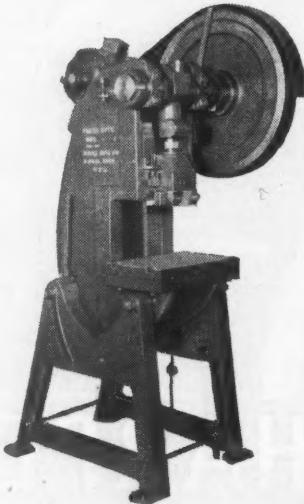
*We urge buying
through the Distributor*

**BROWN & SHARPE
CUTTERS**

**KELLER
POWER HACK SAWS
SEVERAL MODELS**

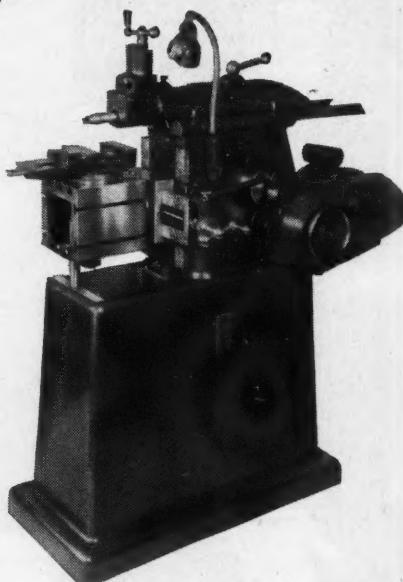


**PRESS-RITE OPEN BACK
INCLINABLE PUNCH
PRESSES
5 TON - 10 TON - 18 TON**



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DISPLAY
A.S.T.E.
NEW ERA EXPOSITION
Cleveland, Ohio
APRIL
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**SHAPE-RITE SHAPER
8-INCH HYDUTY MODEL**



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MACHINE TOOL CO.
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What's all this about SUPERFINISH?

If you've thought of *Superfinish* as a lavishment, then perhaps it's time to look into it a little further. You'll find enough evidence to change your notions—and perhaps give you a new competitive advantage in the form of lower costs.

No matter how fine a ground surface may appear to the eye, it has defects . . . scratches and ridges produced by the point of the turning tool . . . larger defects such as grinder feed spirals and chatter marks . . . partially loosened splinters of metal ready to come off on contact with another surface . . . soft surface metal, annealed by the heat of the grinding wheel. In practically every case, fragmented metal will be torn from the mating surfaces to mix with lubricants, causing abrasive wear and creating a larger amount of clearance.

Superfinishing prevents this by removing both grit scratches and longer pitch defects due to minute machine tool inaccuracies. It provides the surface smoothness to maintain a uniform oil film—to reduce wear—to eliminate bearing trouble and lengthen bearing life.

Superfinishing is a quick and inexpensive process. And in many cases it can reduce present manufacturing costs by eliminating other more costly processes. This is a good time to get complete information about *Superfinishing*. Write us.

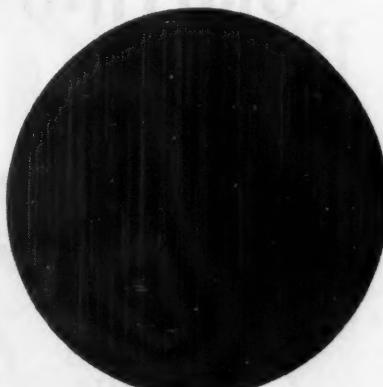
GISHOLT MACHINE COMPANY
1219 East Washington Avenue • Madison 3, Wisconsin



Look ahead

keep ahead

with Gisholt



This photomicrograph (25 x magnification) shows a ground surface with the familiar scratches and ridges caused by single direction stock removal. Surface roughness is 35 micro-inches (Profilmeter reading).



The same piece, 30% Superfinished to 15 micro-inches. Note how ridges have been reduced. A completely Superfinished surface of 2 to 3 micro-inches will leave no defects to penetrate the oil film or abrade the mating surfaces.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

AMAZING GRIPPING POWER

with KETT CHUCKING HOLDERS

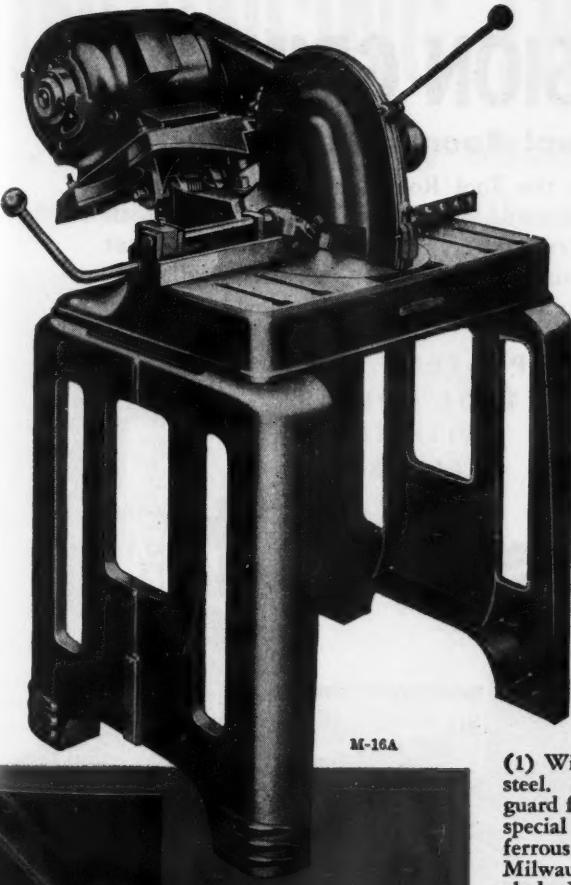


The amazing gripping power of Kett Chucking Holders is indeed an outstanding feature—but no more outstanding than their "right on the nose" accuracy. The small but mighty "three-jaw power grip" chuck takes all shank sizes from #80 drill to $\frac{1}{4}$ " without changes of any kind. Kett Chucking Holders are production proven—for automatic or hand screw machines, lathes and drill presses. Floating types, Morse Taper and Straight Shank Arbor types are available.

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THE KETT TOOL COMPANY

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Cut-Off Machines

... for fast, accurate cutting of a wide variety of materials — to exact length, on a production basis . . .

Down go costs, when you use a Delta-Milwaukee Cut-Off Machine. Two models:

(1) With abrasive wheel for cutting steel. (Also available with swing guard for cutting wood); (2) With special steel blade for cutting non-ferrous metals. • Famous Delta-Milwaukee construction features include: Pre-loaded, lubricated-for-life ball bearings. Dynamically-balanced pulleys. • Delta-Milwaukee Cut-Off Machines cost but a fraction of the usual price for machines of this type. Ask your Delta industrial distributor.

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low-cost Delta-Milwaukee Machine Tools.

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Abrasive
Cutting Machines

Drill Presses



Band Saws

PRECISION GRINDING

In the Tool Room -- In Production

Designed for the Tool Room and Die Shop where precision workmanship is all important...Built with Boyar-Schultz quality, resulting in sturdiness that HOLDS accuracy, not only in tool and die work, but in production wherever accuracy is necessary.

PROTECT YOUR
TOOL DOLLAR
WITH THE
FINEST



No. 618 SURFACE GRINDER

A sturdy, easy operating Surface Grinder, designed for the Tool Room and built to give positive precision performance over long periods of time.

No. 1 PROFILE GRINDER

A bench size Profile Grinder. A time saver in grinding dies, punches, cams and templates. Operates at 20,000 R.P.M. A rapid stock remover.

No. 2 PROFILE GRINDER

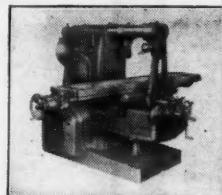
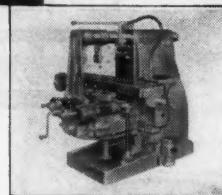
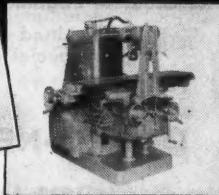
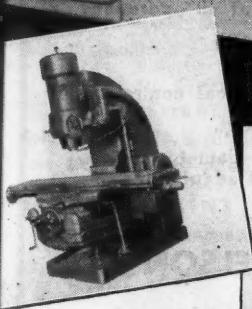
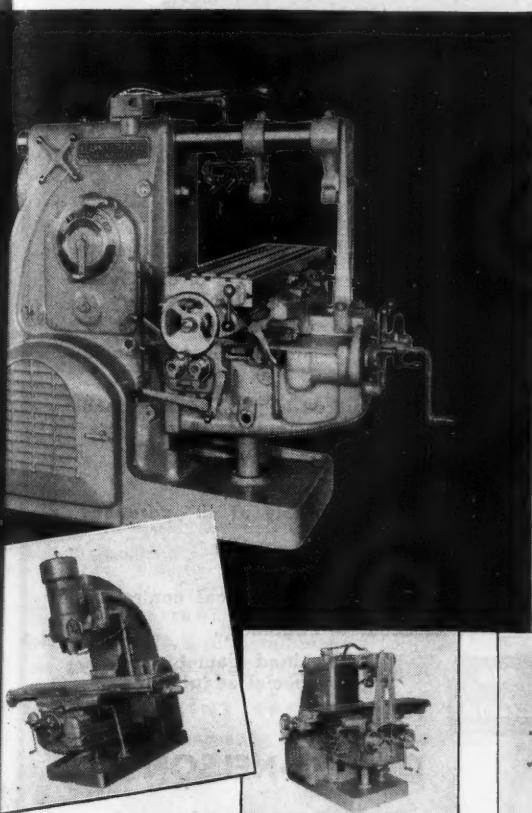
A larger, heavier Profile Grinder with two independently powered spindles, operating at 10,000 R.P.M. with vertical oscillations.

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BOYAR-SCHULTZ CORPORATION
2120 Walnut Street • Chicago 12, Illinois

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... an outstanding addition to the
Kearney & Trecker Milwaukee Line!



A complete series of CSM Machines, high powered for carbide milling of steel — machines that will handle regular milling jobs as well — this is Kearney & Trecker's latest contribution to modern milling equipment.

Pioneered by Kearney & Trecker engineers, the CSM machines embody the newest and finest in design and engineering features to meet the requirements of modern carbide milling of steel: 1) Solid-back column gives powerful support and rigidity to entire machine; 2) A large, heavy fly-wheel is an integral part of the spindle, and assures smooth, balanced flow of power to cutter; 3) Wide range of speeds and feeds to match work requirements.

Time-tested operating and performance features of the famous Kearney & Trecker "K" Machines have also been included to give you the finest in up-to-date milling machine construction and operation. CSM Machines are available in both horizontal and vertical knee-type models. Write for descriptive catalog.

HP VERTICAL MODEL
The CSM Series shows outstanding efficiency and versatility of Kearney & Trecker.

A complete series of power rated machines, in horizontal and vertical models, to meet your requirements.

20 CSM Horizontal — a 20 hp machine.

30 CSM Horizontal — a 30 hp machine.

50 CSM Horizontal — a 50 hp machine.



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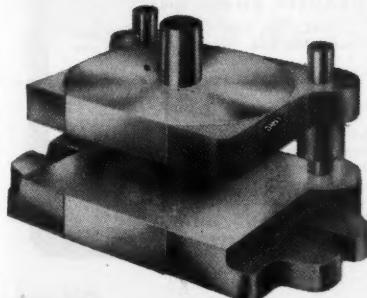


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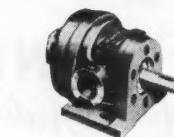
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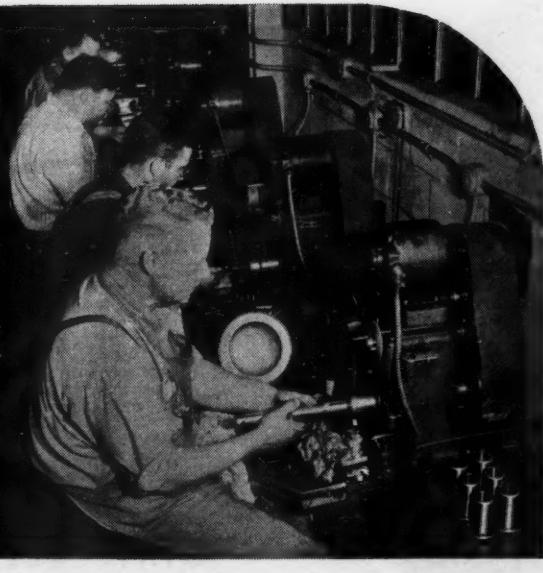
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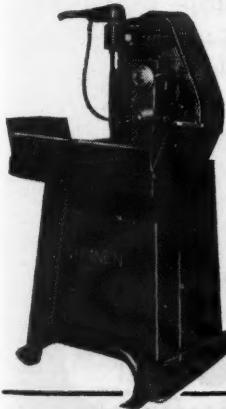
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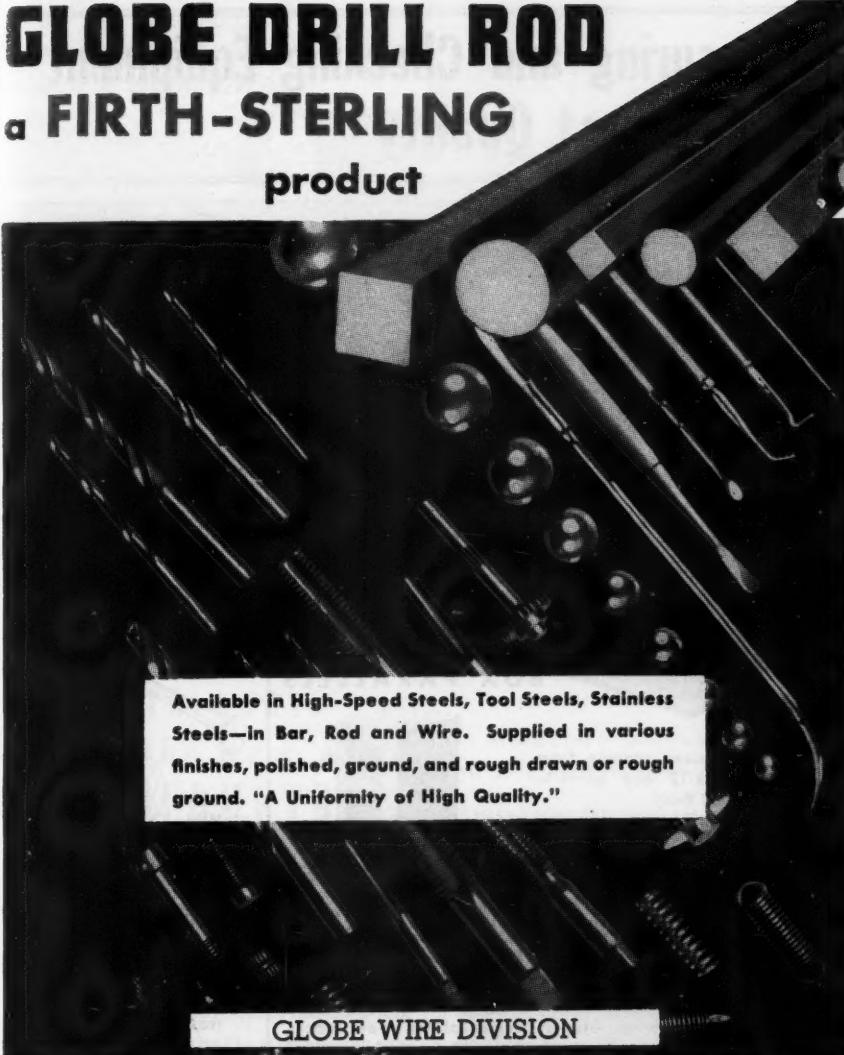
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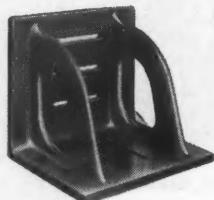
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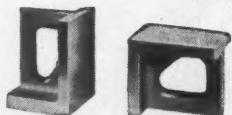
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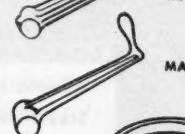
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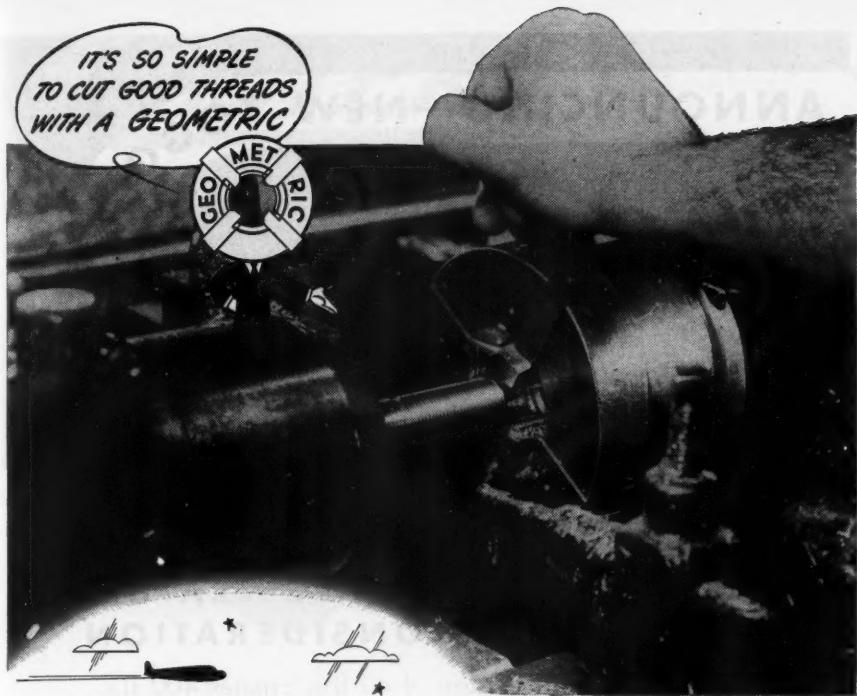


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Threads for the New Age by GEOMETRIC

On the screw machines of today are being cut the threads of tomorrow — threads that will be used in the mechanized products of a new age. And whatever the threading job, you'll find Geometric Die Heads giving precise, rapid performance. The sturdy $1\frac{1}{4}$ " Style "D", Self Opening Geometric Die Head shown in the above photograph (cutting a $\frac{7}{8}$ "-14 NF thread on a Compression Screw for a Steam Valve) is typical of thousands in use all over the world. This particular Die Head

cuts threads from $\frac{1}{2}"$ to $1\frac{1}{2}"$ while the entire Style "D" line cuts threads from $\frac{1}{8}"$ up to $3\frac{1}{2}"$.

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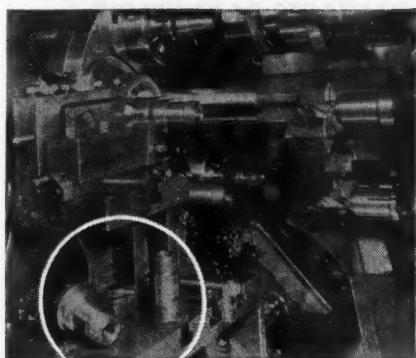
With basic material costs and basic wage rates about the same for you as for your competitors, the one factor you can control fully is *method*.

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Feel free to ask us for Acme-Gridley time estimates on any precision parts you turn out in quantities—on either bar or chucking equipment.

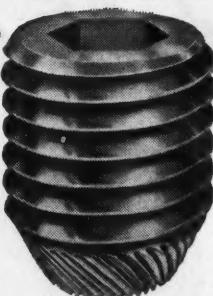


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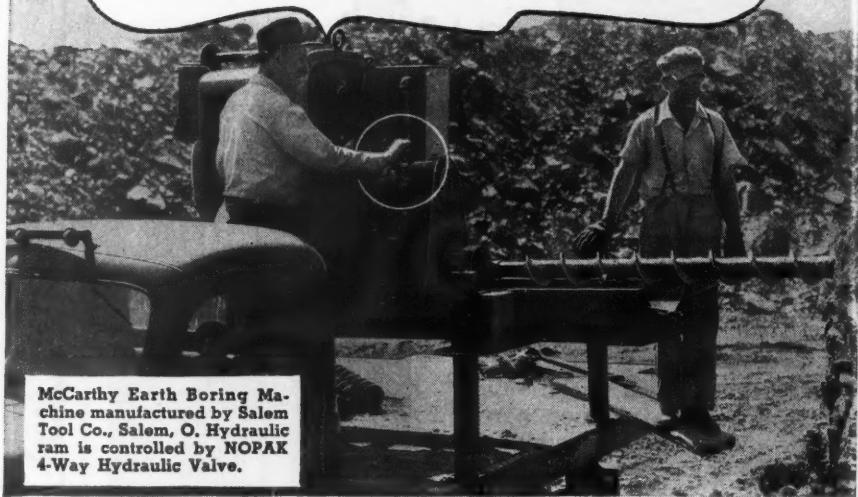
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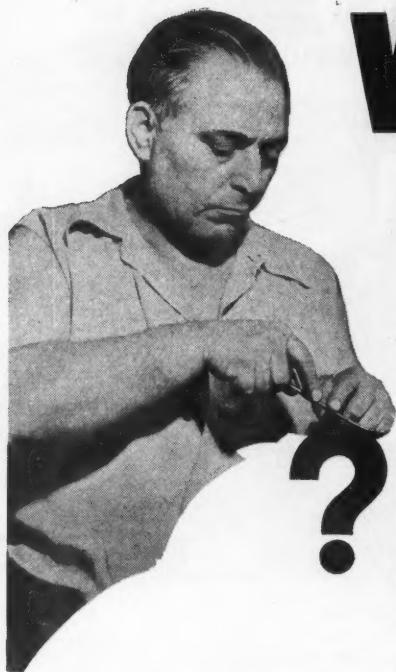
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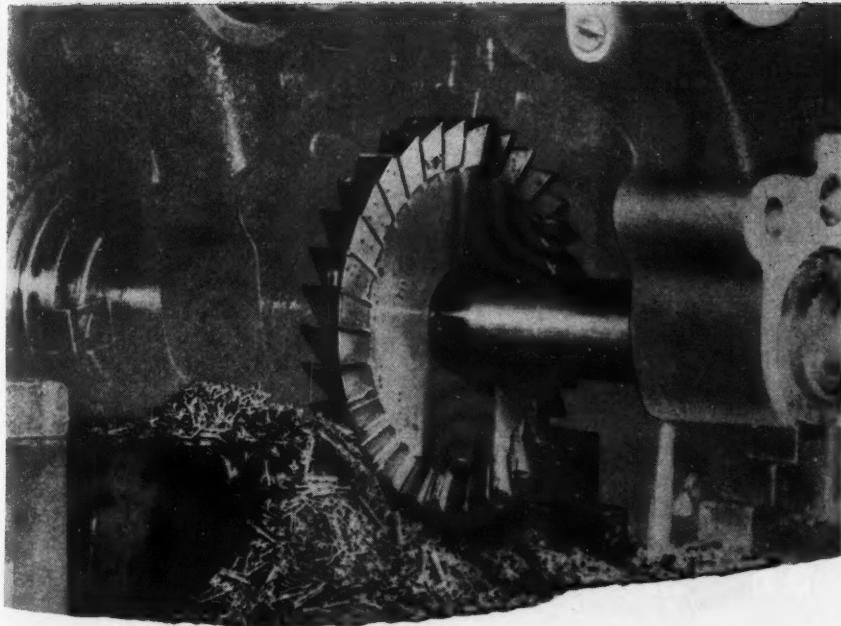
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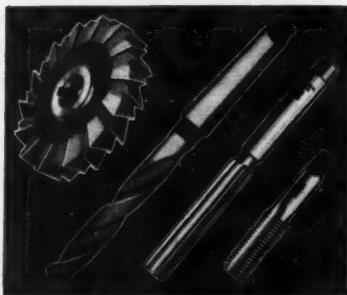
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H-2

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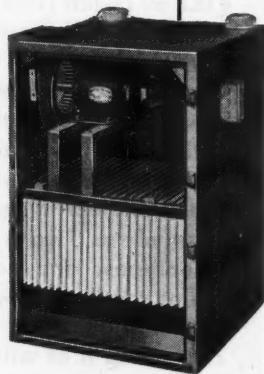
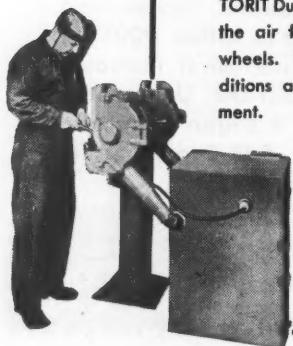
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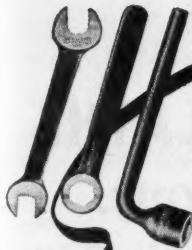
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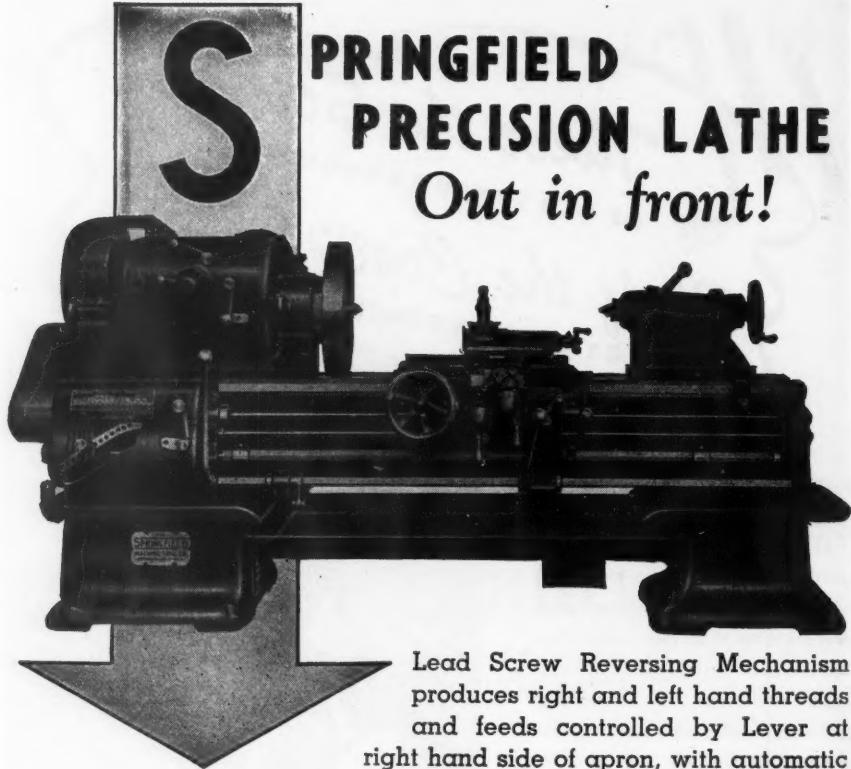
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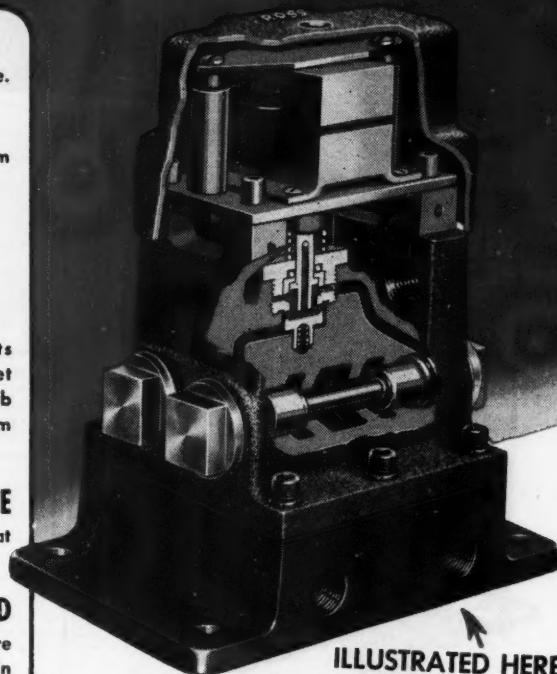
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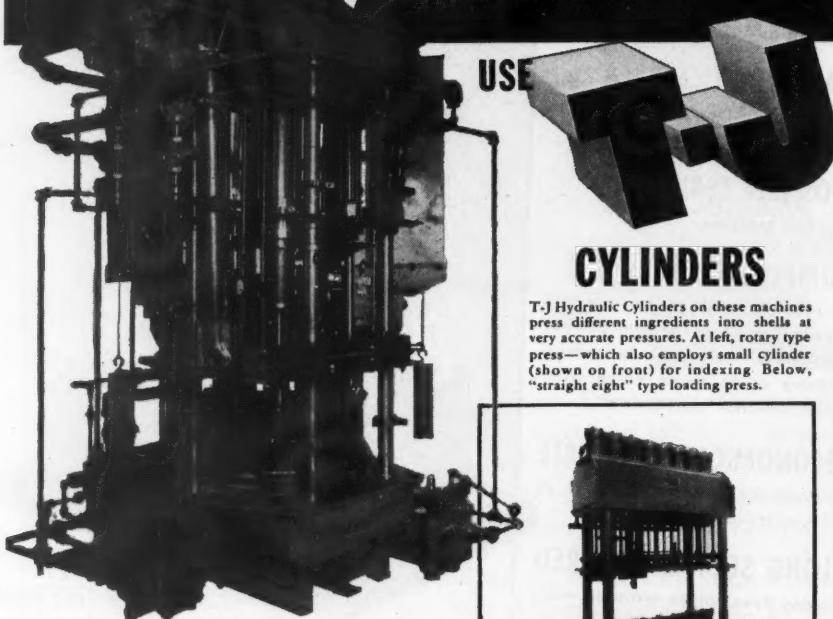
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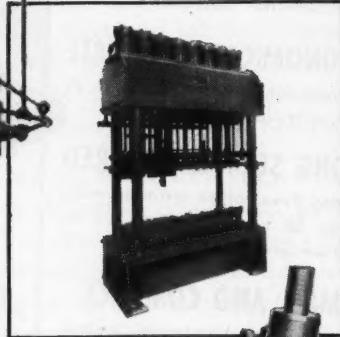
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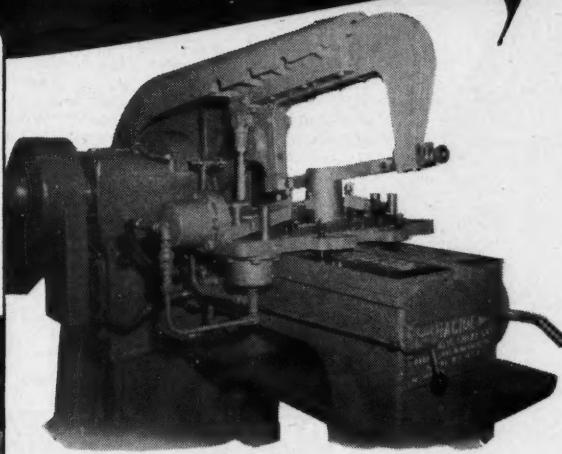
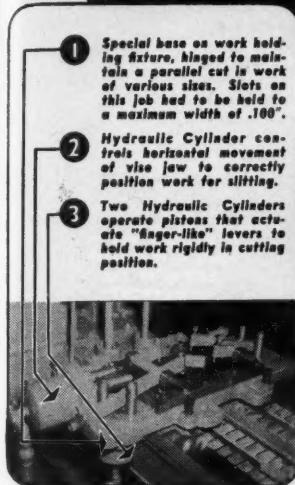
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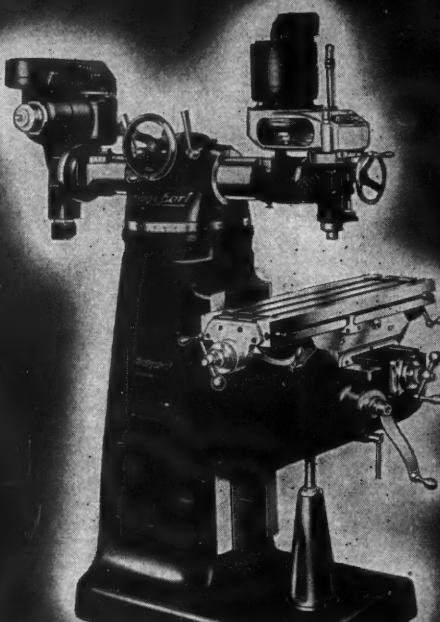
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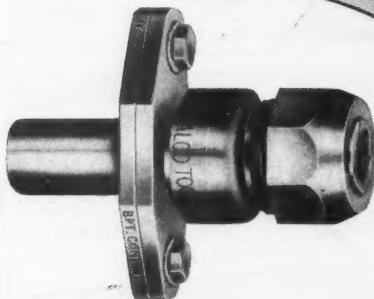
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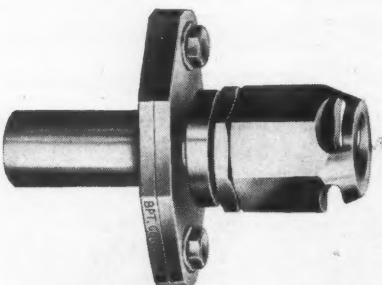
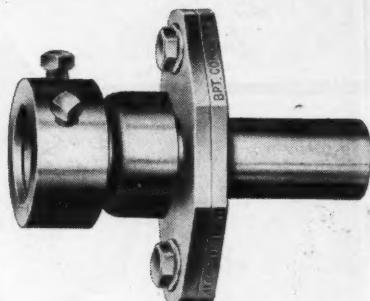
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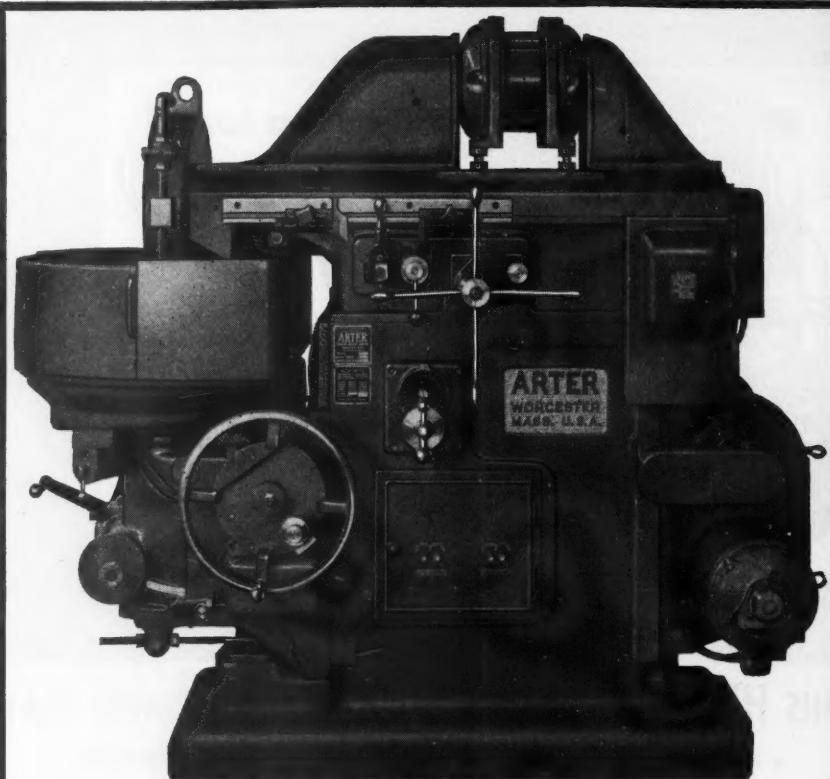
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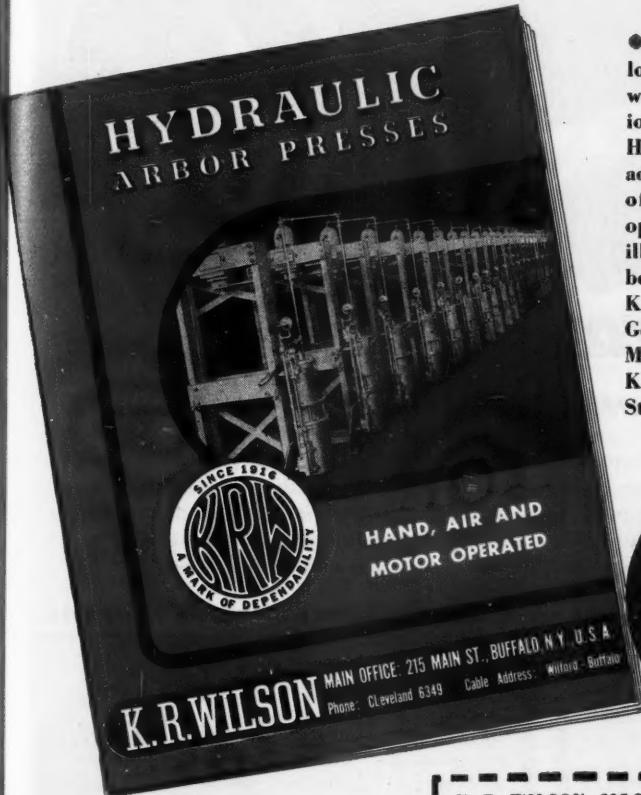
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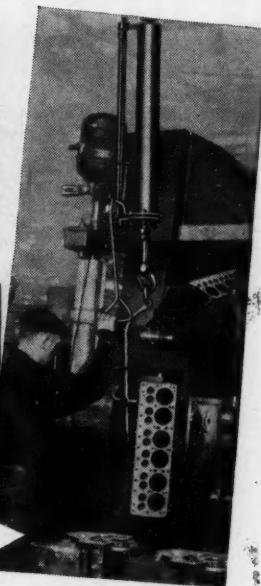
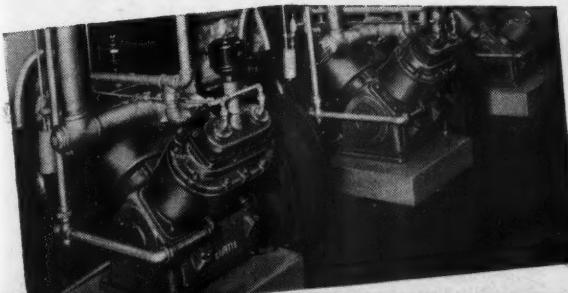
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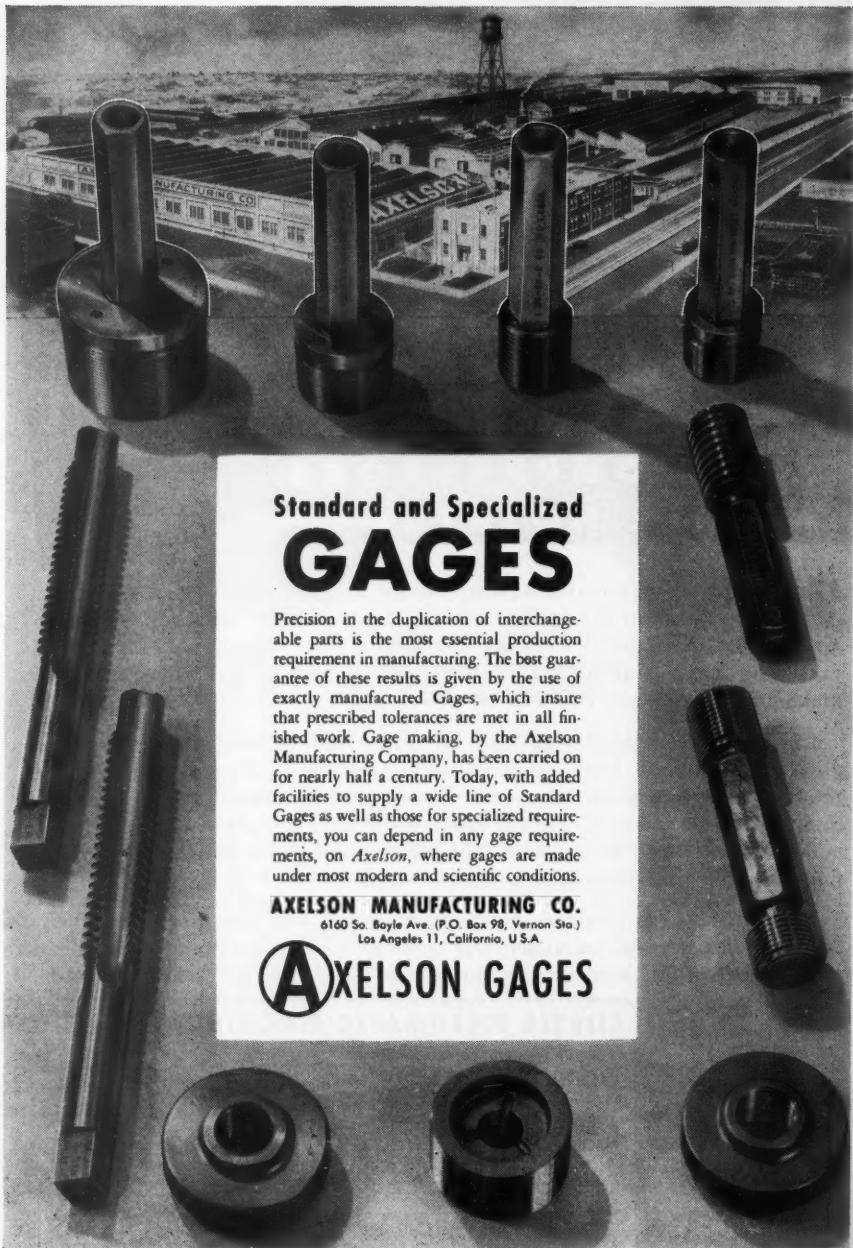
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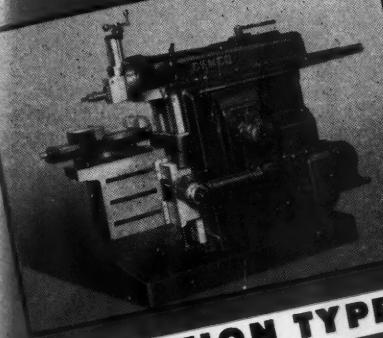
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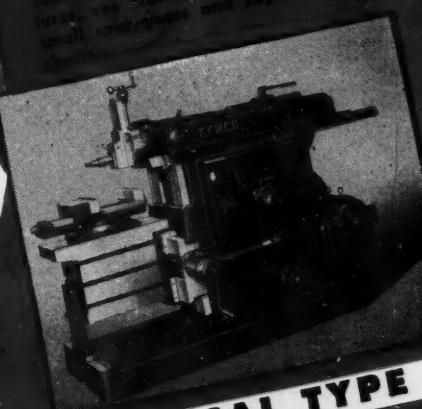
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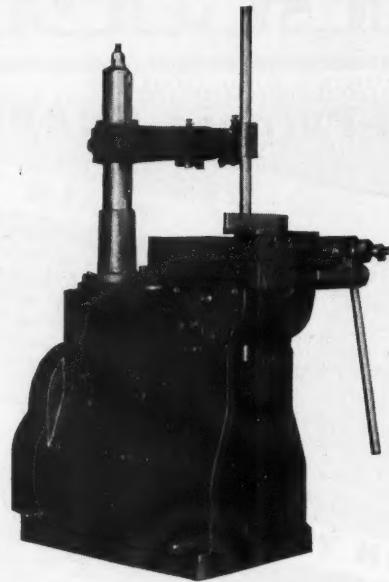
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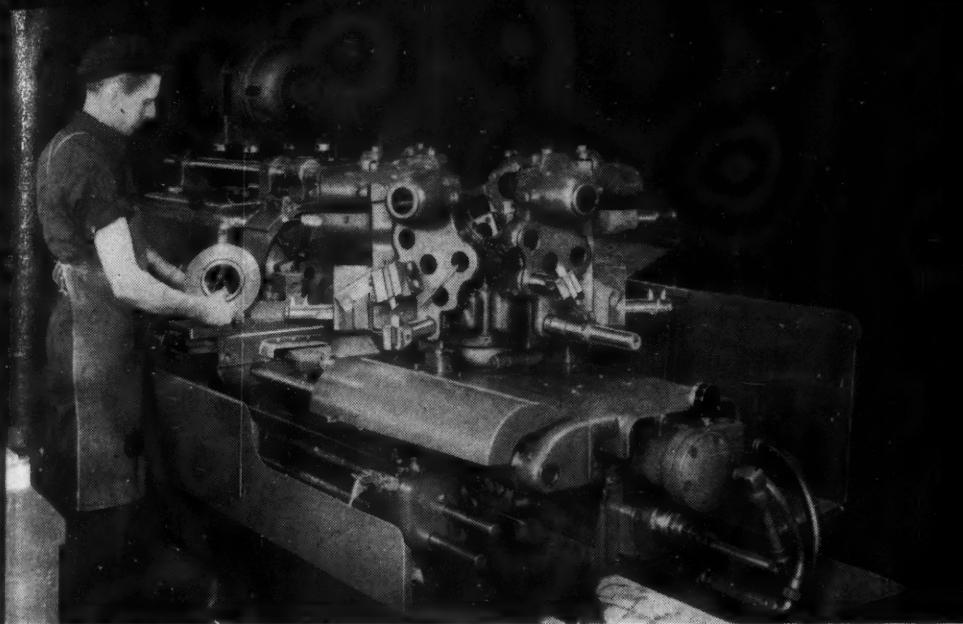
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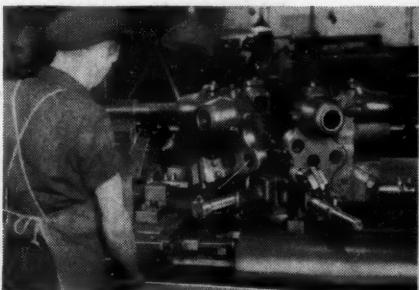
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MODERN Machine Shop

HOWARD CAMPBELL, Editor

VOLUME 18 • NUMBER 11
APRIL, 1946

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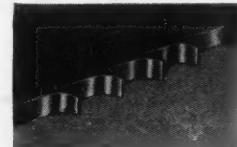
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MODERN Machine Shop

APRIL, 1946

VOL. 18, No. 11

CINCINNATI, OHIO

This Month

The task of keeping railway motive power and rolling stock in operating condition, always of major proportions, has during these past five years been monumental. Adequate recognition will never be given to the thousands of railway shop men who sweated and toiled and improvised with inadequate tools and equipment in order to keep the trains running. Under the stress of wartime conditions many tools and labor-saving devices were developed which will be of interest to the entire railway shop industry, and it is planned to present a number of these tools in future issues of MODERN MACHINE SHOP. Some of the special tools in use in the Boston & Maine North Billerica shops are described in this month's feature article, beginning on page 124.

A number of practical applications of induction heating are presented in the article by Gilbert C. Close which begins on page 136. Mr. Close includes enough theory so that the reader will be able to tell "what makes it work" and shows enough applications so that he can see what can be done by the application of the theory. The second section of this article will follow in the May issue.

The sixth and last article of C. W. Hinman's series "Designing and Using Milling Cutters and Fixtures" begins on page 162. This series has been well received and we have been unable to fill all of the requests that have come in for extra copies of the articles. We will have further articles from Mr. Hinman from time to time.

An outline of the coming Fifth Annual Exposition and Convention of the American Society of Tool Engineers, which will be held at the Public Auditorium in Cleveland from April 8 to 12, is presented on page 186. Every plant executive who can do so should attend this convention and exhibit. Many of the new things that were developed during wartime will be unveiled here for the first time, and the papers that will be read at the convention meetings will, alone, be worth the time and expense of making the trip.

The "Ideas from Readers" section contains the usual number of "kinks" and the "News of the Industry" department is devoted entirely to a report on the American Management Association Personnel Conference which was held in Chicago in February. Incidentally, it is quite possible that complete copies of some of the papers read at the convention might be obtained from the Association's headquarters, which are at 330 West 42nd Street, New York 18, New York.

The editorial, this month, was written for us by James F. Lincoln, President, The Lincoln Electric Company. In view of the excellent labor conditions that have prevailed for many years in the Lincoln plant, Mr. Lincoln's suggestions are usually received with respectful consideration and we are honored and delighted to be able to present this editorial to our readers.

Boston & Maine Shops Well Tooled

**Special "Shop-Designed" Tools Add to Efficiency
of Equipment at North Billerica Shop**

By HOWARD CAMPBELL
Editor, Modern Machine Shop

THE task with which the railroads of the United States have been confronted during the past four and one-half years—that of transporting vastly increased burdens of people and material at a time when tools, maintenance materials, and labor were practically unavailable—has been monumental. For the mechanical divisions of the railroads these have been four and one-half years of continuous emergency, in the fullest meaning of the word.

With shop crews toiling, at times, endlessly on and on until they lost all count of the hours, often working with

hastily-repaired tools that in normal times would have been considered fit only for the scrap pile, they have accomplished the almost impossible task of keeping a constantly-dwindling inventory of engines on the job, carrying millions of troops to the training camps and shipping points, transporting millions of tons of armament, war materials and munitions, and carrying civilians in greater number than ever before in the history of the railroads.

For normal peacetime operation the average railroad shop is fairly well equipped, although a large part of its equipment frequently consists of special tools that have been developed in the individual shop. The North Billerica shops of the Boston & Maine

Railroad comprise a good example of this point. Some of

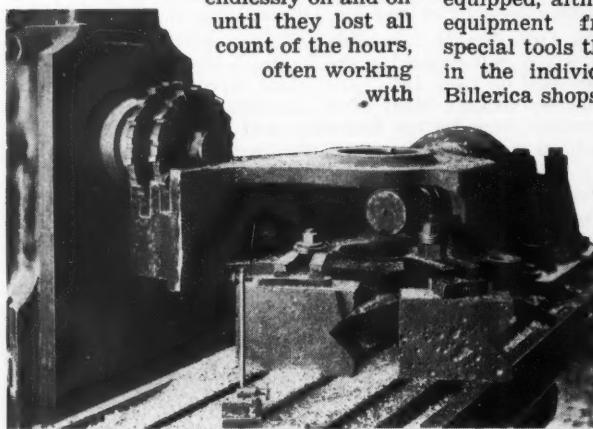


Fig. 1—This milling operation is a part of the process of reconditioning a multi-wear crosshead. When the contacting surfaces became badly worn, they are built up with block tin and remachined to size.

Fig. 2—Using an Ingersoll Duplex Miller to machine the shoe and wedge faces on a driving box. Special gearing controls the feed so that the cut is tapered at each end.

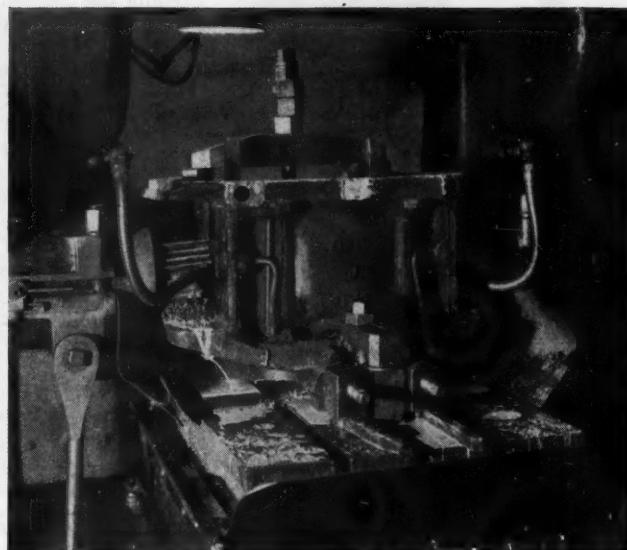
the tools used in the B & M shops are presented in this article.

The illustration Fig. 1 shows one of the operations in the reconditioning of a multi-wear crosshead. When the contacting surfaces become too badly worn for further service, they are built up with block tin to the original dimensions and re-machined to size.

To build up the worn surfaces, these surfaces are cleaned with palm oil and glycerine, then the crosshead is heated and the surfaces are tinned in the usual manner. This done, a wood form is built around the section and sealed with fire clay, after which the molten tin is poured. When the tin is cold, the crosshead is set up on a Cincinnati milling machine as shown and the guide surfaces are remilled to size.

Correct alignment is obtained by mounting the crosshead on a special arbor which enters the rod bearing hole, as shown, and gaging from the center hole in the arbor. The milling is done with two inserted-tooth cutters of 8-inch and 10-inch diameters, carrying high speed steel teeth. This job is an improvement over the planing operation formerly used, both in reduction in time and increase in the quality of the finish.

Another milling job is shown in Fig. 2; the machining of the shoe and wedge



faces on a driving box. For this job an Ingersoll Duplex Miller is used, equipped with two 5½-inch cutters. The box is clamped firmly to the machine table, as shown, mounted on a steel pad under either side. Two cuts are taken across each face of the box, one at the bottom and the other across the top. Special gearing controls the feed so that the cut is tapered correctly at each end.

As the work feeds past the cutters, the heads carrying the cutters rise $\frac{1}{8}$ inch in 12 inches, producing an angle of 2 deg. 34 min. The angle cut is taken as the table feeds seven inches, then the heads remain stationary while the cut proceeds two more inches, then feed downward at the 2 deg. 34 min. angle for the remaining seven inches. At the end of the cut the heads are raised the required height, the table is reversed, and the same process is followed on the return cut. Thus it is possible to obtain the correct angle and dimensions and to mill the face and both flanges at the same time. This setup replaces five

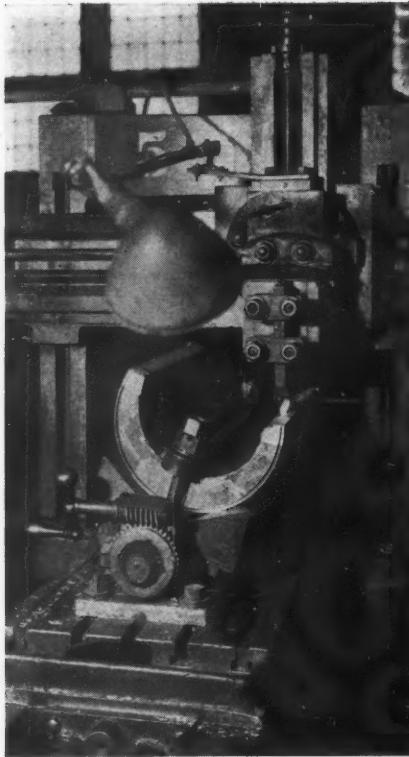


Fig. 3—Planing toe-fits in brass driving box liners, using a Cincinnati shaper equipped with a Spicer fixture.

planers formerly required for the same production.

The tooling for planing toe-fits in brass driving box liners is shown set up in Fig. 3. The machine is a Cincinnati shaper, equipped with an Apex toolholder and a Spicer fixture. The fixture consists primarily of a heavy vee-block so hung that it can be tilted sidewise in either direction by means of a worm and wormwheel. Correct alignment is obtained by setting the vee-block with a surface gage. The cutting tool can be changed to suit the side that is to be machined without dis-

turbing the toolholder. With this setup a liner can be machined complete in one setting.

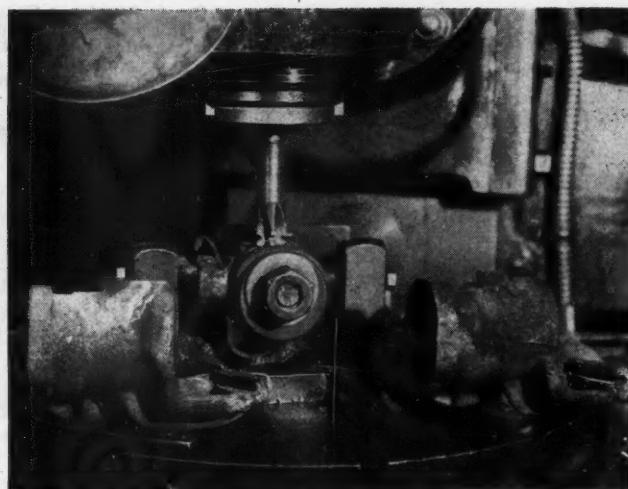
In Fig. 4 an operator is shown in process of finish turning a valve tee ring that has previously been semi-finished in another department. The feature of this job is the fixture, which is designed to hold the work for the machining of two diameters and the face in a single setting so that all three surfaces will be concentric and square with each other.

The fixture is practically a faceplate with a shoulder turned on it to provide means for holding the ring concentric and with a stud projecting from the center of the plate that serves, with the aid of a short sleeve, washers and

Fig. 4—Finish-turning a valve tee ring. Two diameters and the face are machined in a single setting.



Fig. 5—Steam hose coupler heads are reclaimed, when badly worn, by building up the worn cam-locks with a welding torch and remachining the pieces.



a nut, to hold a circular clamping plate in position against the face of the work-piece. Four steps are provided on the fixture to hold four different sizes of rings in 8, 11, 12 and 14 - inch diameters. According to the shop foreman, this fixture makes it possible to do a much better job than can be done by the use of an ordinary chuck.

In Fig. 5 a vertical Kampsmit milling machine is shown set up for milling cam-locks on reclaimed steam hose coupler heads. These heads were formerly thrown in the scrap when they became too badly worn for further use, but it was found that by building up the worn spots by acetylene welding and then re-machining the pieces, they could be saved.

For the re-machining operation, the coupler head is held in a special fixture as shown in the illustration, and the milling is done with a special form cutter designed especially for this job. The fixture is of simple construction; the design is immediately apparent from the photograph. A welded coupler head is shown at the right on the circular machine table, and one that has been re-machined is shown at the left.

The equipment shown in Fig. 6 is set up to press a Walschert link trunnion pin out of the trunnion sleeve. The machine is a vertical Lucas press

and the special equipment required consists of a split bushing, containing a tooth or spline of the proper size to fit into the groove extending around the sleeve, and a circular plate that is bored just large enough to take the trunnion sleeve and counterbored to provide a support for the split bushing.

In Fig. 6 the link trunnion is shown in position to remove the sleeve, with the split bushing in position on the sleeve and supported by the shoulder of the counterbore in the circular plate. With the plate resting on supports on either side, the link trunnion is suspended underneath the plate, being held only by the spline in the split bushing. The split bushing is held in position around the sleeve by the wall of the counterbore in the plate. With this equipment the trunnion pin is easily pressed out of the sleeve.

The link trunnion and the circular plate and split bushing are shown in Fig. 7.

To countersink grease holes on the inside of floating bushings, the simple piece of equipment shown in Fig. 8 was devised. For this operation the bushing is positioned in a simple cir-

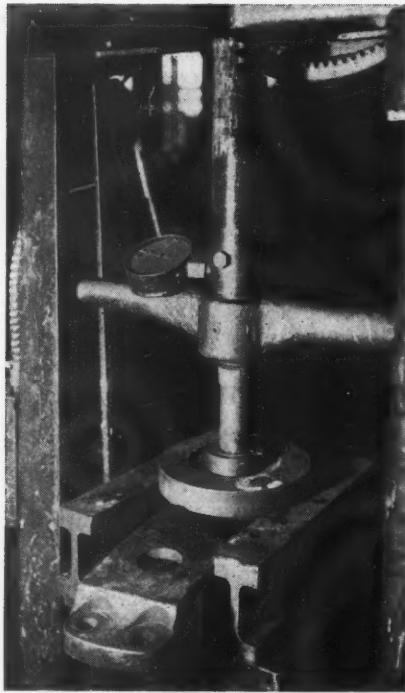


Fig. 6—Pressing a Walschert link trunnion pin out of the sleeve. Besides the press, the only tools required are a split bushing and a circular plate which is counterbored to fit the bushing.

cular fixture, as shown, which rides on two ways on the base of the fixture so that the bushing can easily be moved backward and forward. Not being clamped, the bushing is easily revolved by hand in the fixture.

The tool is an ordinary countersink of the type that is usually used for this purpose, held in a spindle carrying one of a pair of bevel gears, the mating gears being positioned on the end of a drive shaft that ex-

Fig. 7—At the left of the Walschert link trunnion are the split bushing and the circular plate. Note the spline in the bushing, which fits into the groove around the trunnion sleeve.

tends back to the motor at the rear of the fixture. The motor is mounted on a plate that is hinged so it can easily be tilted as required for the countersinking operation. Springs under the tilting plate serve to steady the plate and assist in manipulating it.

The motor is of the correct size to provide the proper speed to the countersinking tool and, when the operation is in process, all the operator has to do is to move the countersinking tool up and down with one hand while revolving and positioning the sleeve with the other.

Moving car wheels out of the boxcar in which they were shipped to this shop and into the shop was a rather tedious job until the simple piece of equipment shown in Fig. 9 was devised. A platform was erected close to the track, of a height which would be level with the car floor so that the wheels could be rolled directly out of the car onto the platform. Each wheel is stopped at the head of an incline and is then tipped over onto the incline so that it can slide down onto a chute upon which it is guided, by means of side

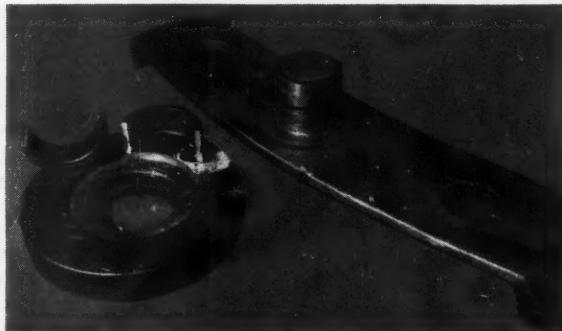
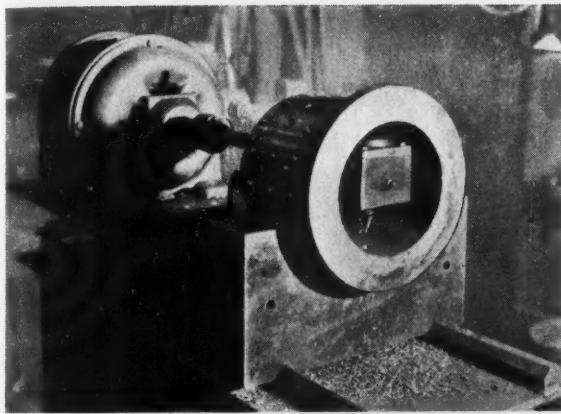


Fig. 8—Special machine devised for countersinking the inner ends of grease holes in floating bushings. Simple, but efficient.



rails, through an aperture in the wall and into the shop. Thus one man can roll the wheel onto the platform and tip it onto the incline; the wheel then moves by force of gravity to the end of the guides inside the shop. From this point a workman rolls the wheels to a storage area adjacent to the boring mills.

Of course the whole structure is substantial and of heavy construction. The framework of the incline is made from sections of steel rails welded together, with a curved section of boiler plate to guide the wheel to its position on the chute upon which it moves into

the shop. The device saves a great deal of time and labor.

To assemble the car wheels to the axle so that they can be pressed on in a wheel press, the axle is picked up by the crane and swung into position with one end extending over a

movable platform in the floor as shown in Fig. 10, then the wheel is lowered onto the platform, the end of the axle is positioned in the bore of the wheel, and the wheel is moved onto the axle by movement of the platform.

The platform consists of a section of

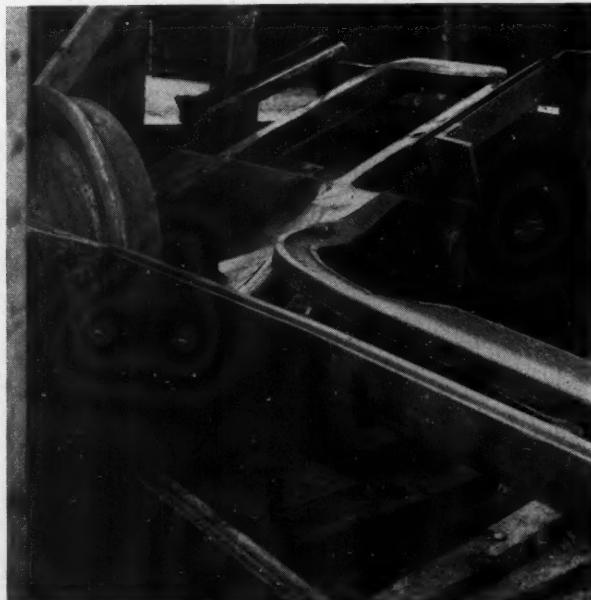


Fig. 9—With the equipment shown here car wheels can be unloaded from a box car and moved into the shop without any lifting, conveying or hauling.

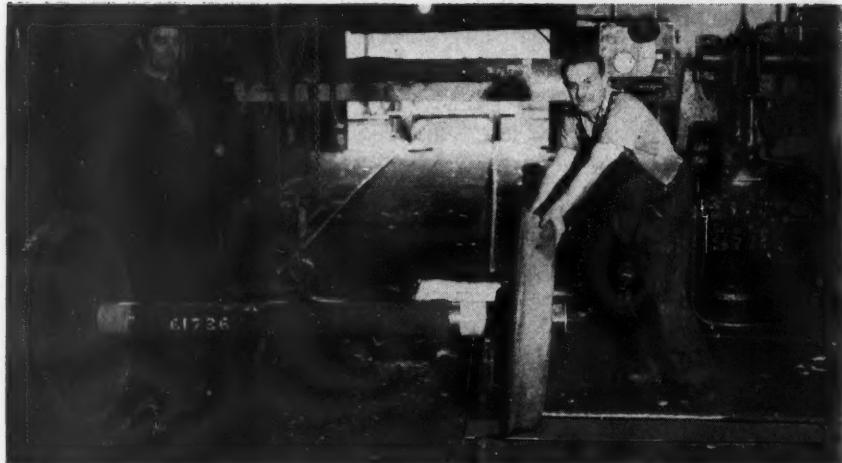


Fig. 10—A moving platform, attached to the piston of an air cylinder and controlled by a button in the floor, simplifies the task of assembling car wheels to their axles.

heavy plank mounted on a metal slide so that it can move easily in a lengthwise direction, and attached to the piston of an air cylinder so that, as the air valve is opened and closed, the platform moves forward horizontally. Heavy springs attached to the plat-

form pull it back to its original position when the air is released. The air valve is connected to a button in the floor upon which the workman steps when the wheel is in position to be moved onto the axle. When both wheels are in position on the axle, the axle is easily moved a short distance to the wheel press.

There are many forgings that must be normalized before they can be used, and many parts which must be annealed.

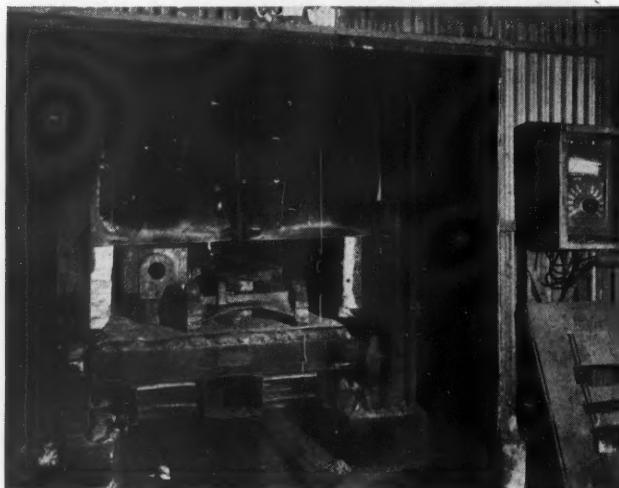


Fig. 11—'Home-built' car-bottom furnace for normalizing forgings, annealing welded parts, and similar work. Of comparatively simple construction, the furnace is considered indispensable.

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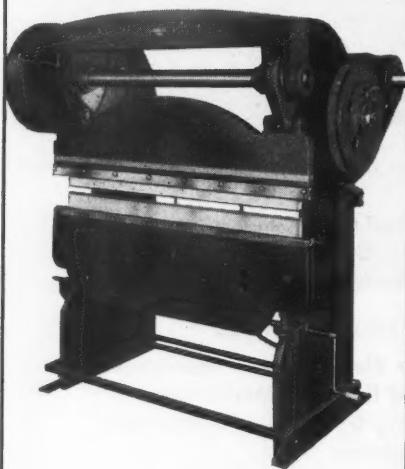


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ed after welding, all of which is done in the car bottom furnace shown in Fig. 11. The furnace is built of steel and brick in the usual manner and a track extends through the furnace upon which a small flat car is moved to transport the work. Doors at each end of the furnace are raised and lowered by means of air hoists.

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National Instrument Conference and Exhibit

Plans have been completed for the first National Instrumentation Conference and Exhibit to be held in the Wm. Penn Hotel, Pittsburgh, from Monday, September 16th to Friday, September 20th, 1946. The Instrument Conference and Exhibit, sponsored by The Instrument Society of America, was originally planned for the corresponding week in September, 1945 but was changed to avoid interfering with the heavy transportation demands at that time.

The Instrument Conference held in conjunction with the Exhibit will include daily technical sessions. Several other societies are planning instrumentation programs in Pittsburgh at that time.

An unusual feature of the technical program will be a series of educational courses (short courses) which will be directed by Dr. B. R. Teare, Professor in charge of Electrical Engineering at the Carnegie Institute of Technology. Dr. Teare is Chairman of the Educational Committee of The I. S. O. A.

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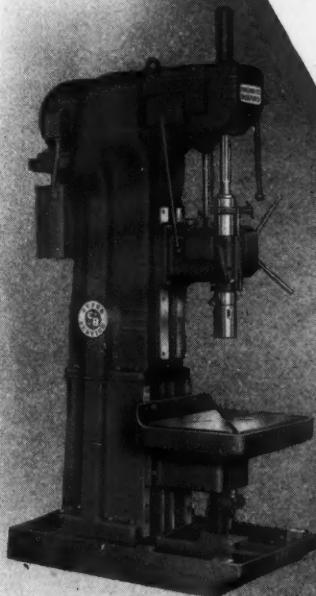
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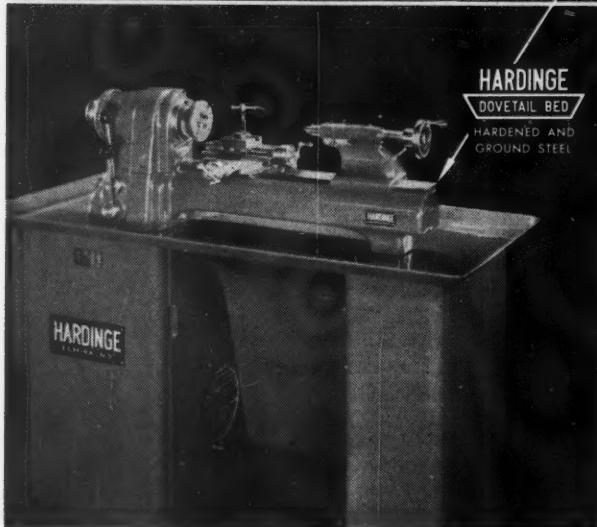
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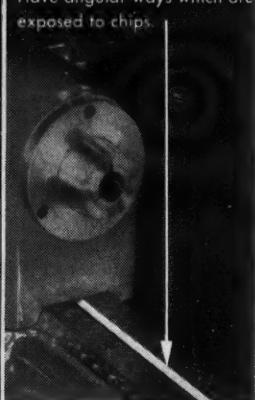
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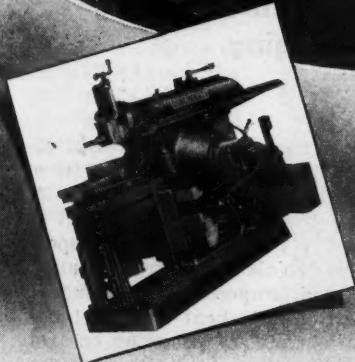
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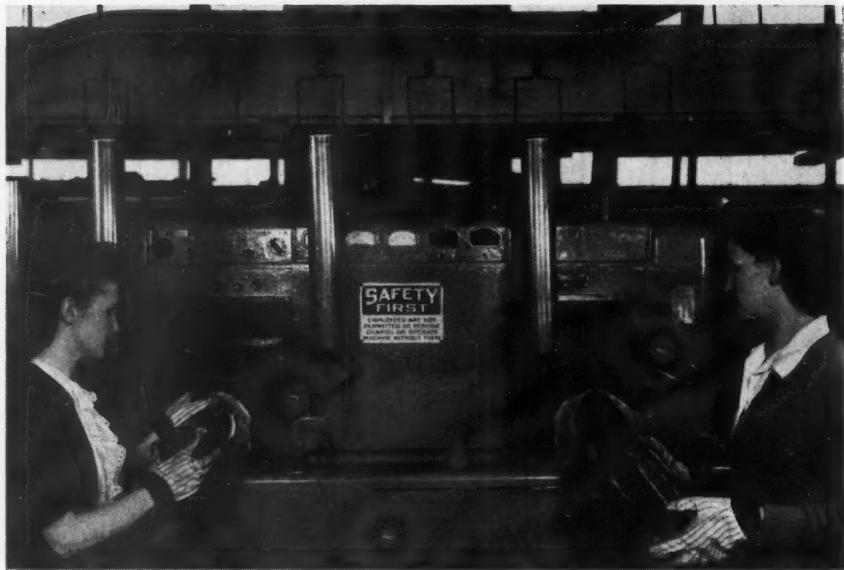
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Fig. 1—Annealing 105 mm Shell Cases by the Induction Method

Induction Heating, I

Theory and Application of the Induction Heating Process In Brazing and Forging.

By GILBERT C. CLOSE

ONE of the greatest contributions to the science of heat treating during the past decade has been the development of efficient and economical equipment for induction heating. Induction heating has made it possible to lift many heat treating operations from the conventional heat treating department and incorporate them into the production line alongside of such operations as forming, inspection, and general assembly.

Induction heating has made possible

the use of new and cheaper steel alloys, and the incorporation of these alloys in new principles of design. It has made possible the elimination of many costly post-heat treating operations such as cleaning, straightening, drawing and tempering. Above all, it has contributed to heat treating technique an element of precision control far exceeding that obtainable by some of the older methods.

This statement is not intended to imply that the induction heating coil

has or will to a great extent replace the heat treating furnace. But within its own sphere of localized heat applications such as surface hardening, spot hardening, brazing and through heating for forging, the induction heating process has certain proved advantages.

Induction heating units may be stationed to advantage on any production line without affecting surrounding operations. Modifications of the unit for treating different parts, or for performing a variety of operations, can be accomplished as quickly and easily as changing chucks in a lathe.

Induction heaters are classified according to the method employed for generating the power and frequency that energizes the heating coil. Three types of heaters are currently available: (1) the type that employs a motor-generator set for power generation; (2) the type that employs a resonant spark gap; and (3) the type that uses a vacuum tube oscillator. Each has advantages and disadvantages, and each is partially limited in the types of work it can perform. At the same time there is considerable overlap in the utility of the three types, thus assuring a range of applications that will satisfy most production line requirements.

Motor - generator sets are available with capacities ranging upward to 250 kva output; thus this type is indicated

as a logical choice when maximum power is necessary for deep heating of large parts. However, the frequency range of this set is limited by mechanical design to approximately 15 kilocycles, and certain advantages of the higher frequency ranges are lost. Also, a maintenance problem is to be expected due to the high speed rotating machinery involved, and there is considerable loss of efficiency due to friction and windage. The set is air-cooled by a fan attached to the shaft of the motor-generator set.

Resonant spark gap units are available in capacities ranging upward to 35 kva, and with adjustable frequency limits between 80 and 200 kilocycles. The resonant spark-gap circuit consists of a step-up transformer for converting standard frequency low voltage energy to a potential of approximately 3000 volts. The transformer terminals are shunted by a circuit consisting of a spark-gap, capacitance and inductance, and the ratio between capacitance and inductance, along with spark-gap characteristics, influences

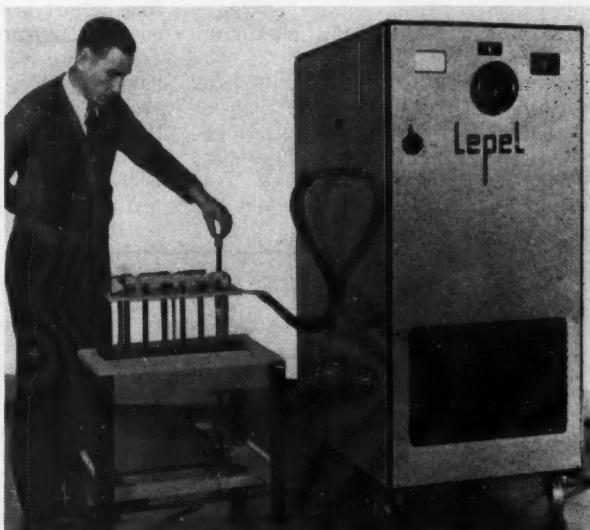


Fig. 2—Spark-Gap Induction Heater with Fixture for Brazing Six Bushings in a Single Operation.
(Douglas Aircraft Photo)

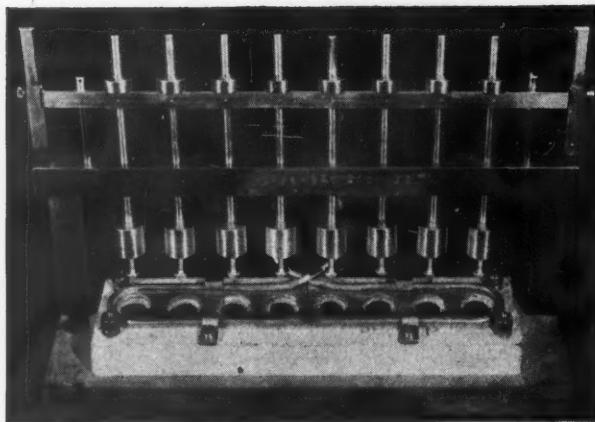


Fig. 3—Single-Turn Coil
Designed for Brazing Ex-
tensions on Eight Bolt
Heads Simultaneously.
(Douglas Aircraft Photo)

the frequency at which the current flows in the closed circuit.

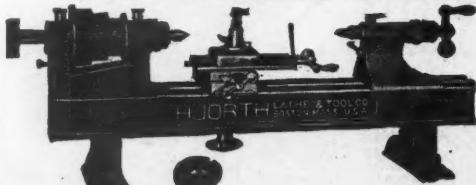
The output of the unit is generally drawn from a second inductance coil magnetically coupled to the main inductance of the circuit. Spark-gap units have no moving parts, and are simple in construction. Occasional reconditioning of the spark gap is the only maintenance problem involved. The principle disadvantage of these units is the relatively low maximum output.

Vacuum tube oscillator units are available with outputs from 5 to 60 kva, and with frequency ranges between 100 kilocycles and 15 megacycles. The extremely high frequencies are generally employed for

and capacitance circuit to control the output frequency. Standard alternating input current is converted to high potential full-wave d.c. and is used to charge a capacitance through the oscillator tube circuit. The discharge from the condenser passes through an inductive shunt circuit in series with which are the output terminals of the unit. Modifications of this circuit are employed in different vacuum tube units.

These units, like the resonant spark-gap units, have no moving parts, and are extremely simple to maintain. Records indicate that the life of the vacuum tubes is between 10,000 and 15,000 hours. The tubes must be water-cooled during operation, but the

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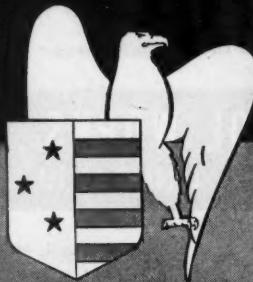
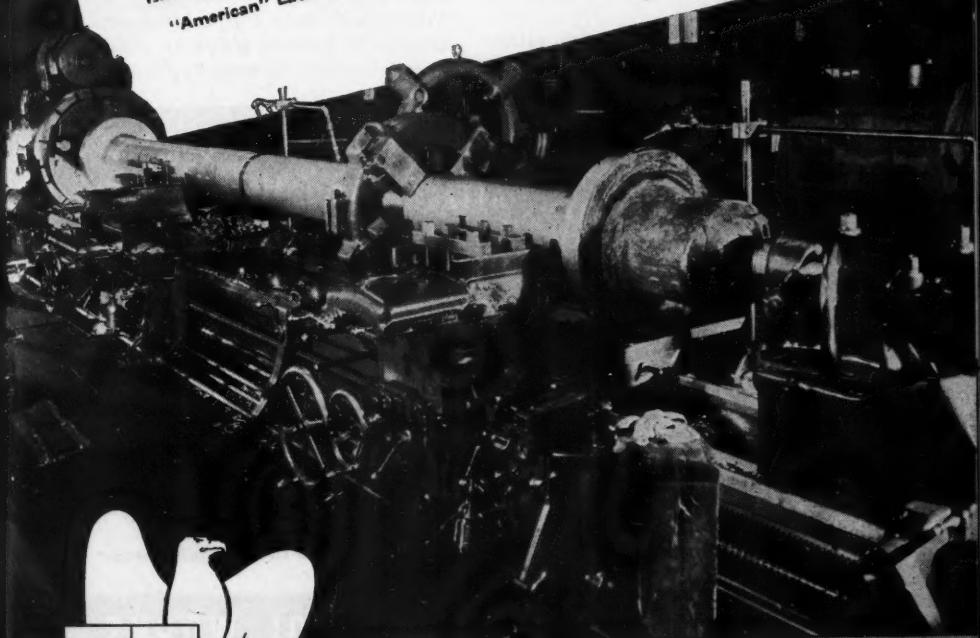
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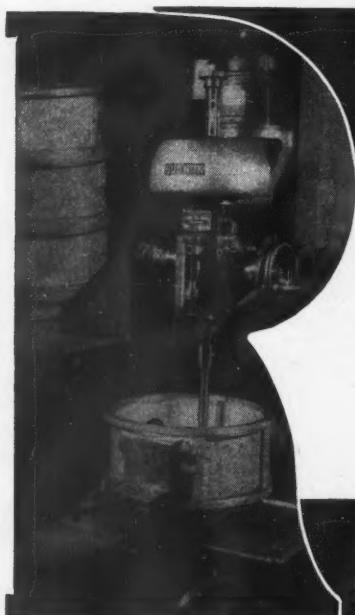
same water that is used to cool the tubes may be directed through the heating coils, thus eliminating the necessity of dual cooling circuits. Vacuum tube units are extremely compact in size relative to output and are completely silent in operation, and the inherent characteristics of the vacuum tube circuit assures a fixed, unvarying power frequency.

A fundamental conception of the theory on which the induction heater operates is necessary to appreciate the advantages of its applications. All induction heaters have one common characteristic; each consists of two major components—the power generating unit, and the heating coil. When an alternating current is sent through the heating coil, a magnetic field that fluctuates in conjunction with the current is generated in the vicinity of the coil windings.

When a conducting material, either ferrous or non-ferrous, is brought

within the sphere of this fluctuating field, eddy currents are induced in it much in the same manner that they are induced in a transformer core. Resistance of the material to eddy current flow causes a rise in temperature analogous to the rise in temperature of an electric light filament due to its resistance to current flow. When the metal being heated is magnetic in character, a second factor, termed hysteresis, or resistance to magnetic change, adds to the overall heat generated within the part.

The ability of the induction heater to localize heat within the part evolves from three inherent characteristics of the process. The intensity of the magnetic field generated within the coil windings diminishes rapidly as distance from the windings is increased; thus coil design alone, bringing the windings in close conjunction with the area to be heated, plays an important role in controlled heat applications. A



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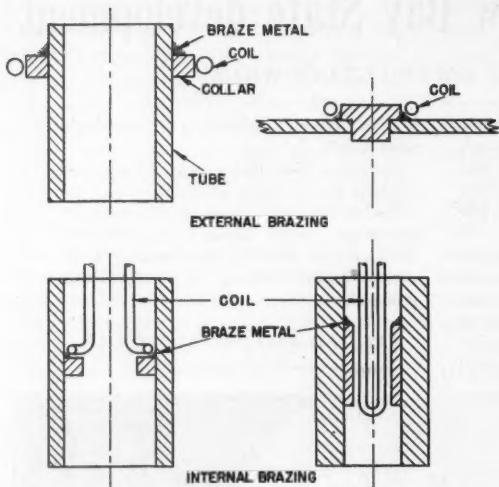


Fig. 4—Cross-Section Drawing Illustrating Placement of Coils for External and Internal Brazing.

second pertinent factor is the speed at which parts are heated. The temperature may be raised to the desired level within a matter of seconds, thus limiting spreading of the heated area by conduction through the metal.

A third factor which contributes to heat control is the inherent characteristic of a high frequency current to travel near the surface of a conductor. This characteristic becomes more pronounced as frequency increases. When, however, the surface of the part becomes thoroughly heated, its resistance is increased and the eddy currents are forced progressively deeper into the metal. It is thus possible to control within very narrow limits the depth to which the metal is heated.

When through heating for forging is desired, it is obvious that progressive penetration of the eddy currents will cause the center of the part to become heated both by induction and conduction without overheating or burning the surface metal, as the high resistance of the surface metal minimizes further heating tendencies. In this conjunction, however, the coil coupling should be looser than when used for surface heating.

As Part II of this article will deal entirely with use of the induction-heater for surface hardening, we will for the time ignore its advantages in that connection and concentrate upon use of the process for brazing and for through-heating of parts subsequent to forging. The advantages of the induction heater for brazing are almost too obvious to mention, but a few will bear close scrutiny from the standpoint

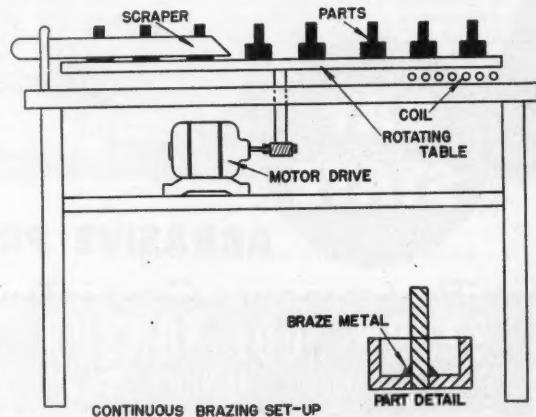
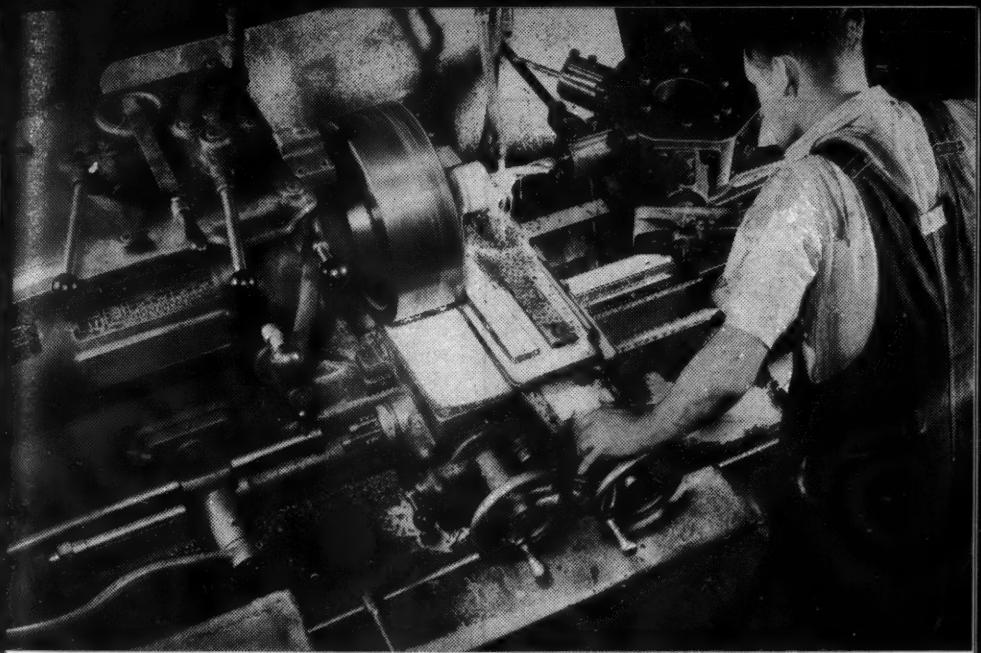


Fig. 5—Diagram Illustrating Design of Rotating Table for Continuous Braze.



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There are three conventional methods for producing a part of complex shape and outline; by hot forging, by machining from billet stock (with a considerable waste of metal), and by brazing simple parts together. Formerly, brazing by the furnace method was a costly and cumbersome process which involved excessive time, high skill on the part of the operator, and a tremendous amount of wasted heat energy, and produced a part that required pickling and cleaning to remove the surface oxides that accumulated during the brazing process. The disadvantages of flame brazing are quite analogous to those experienced with the furnace process.

Brazing with the induction heater, overcomes these disadvantages in a thoroughly efficient manner. But a few seconds are required to braze a part, operational skill requirements are negligible as the process is almost automatic in operation, heat requirements are kept at a minimum, as only the surfaces that are to be brazed are heated, and the rapidity of the process prevents accumulation of scale or other surface oxides that must be removed by cleaning.

Actual records prove that the cost of brazing by induction favors the process almost 10 to 1 over other methods. This ratio will run even higher on massive parts that would absorb a tremendous amount of heat energy in furnace brazing.

The function of the heat employed in brazing is to raise the temperature of the surfaces to be brazed above the flow-point of the braze metal. By paying careful attention to heating coil design, heat requirements may be kept at a minimum and the heat pattern may be applied in a manner to produce brazing temperatures in the areas required without, however, appreciably affecting the adjacent metal.



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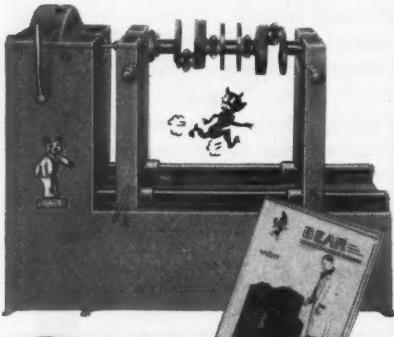
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For the simple function of brazing a collar on a tube or shaft, the heating coil may be designed to surround the collar, heat it by induction, and allow the underlying shaft or tube surface to be heated by conduction from the collar. If a stud is to be brazed in a hole in a flat plate, the coil can be designed to surround the stud in close conjunction with the plate surface, thus allowing both components to be heated by



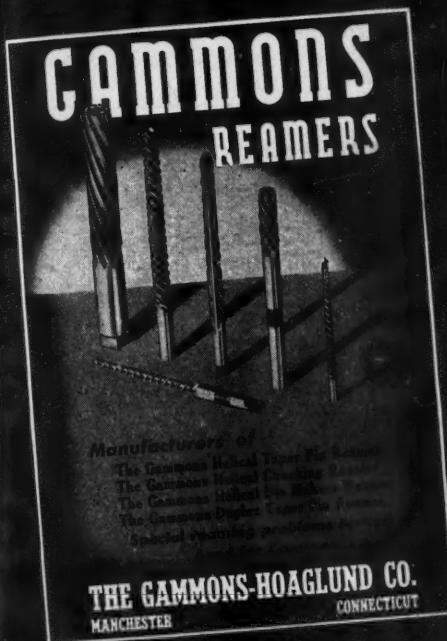
(Douglas Aircraft Photo)

Fig. 6—Aircraft Machine Gun Mounting Posts with Collars and Thread-Rings Brazed in Place By Use of Induction Heating. These Parts were Not Cleamed after Heating; Note Absence of Scale.

induction. In either instance, as soon as the mating surfaces reach the proper brazing temperature, the braze metal will melt, flow through the joint and, due to inherent surface tension of the melted metal, form a neat fillet on either side of the joint.

In certain instances, internal heat applications may be indicated. This problem can be overcome by designing

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the coil to fit inside the work. Such coils may be in spiral form, or a simple loop, depending upon the size of the work and the clearance for coil insertion. The illustrations are indicative of coil design flexibility, and the positions in which coils may be placed to produce desired heat patterns.

When brazing small parts, it is often desirable to process several parts at one time. Coils that will facilitate multiple brazing are easily designed, and are limited only by the capacity of the induction heater with which they are used. Two coils may be employed, operated by a double throw switch and cut-off, so that one coil can be loaded while the other is in operation.

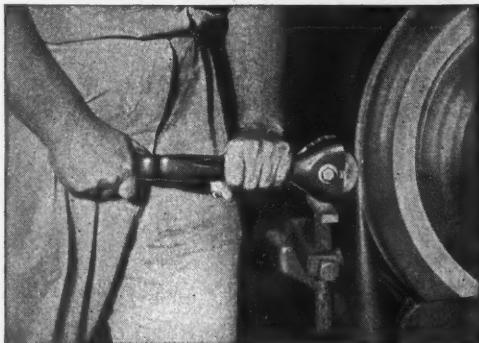
Continuous brazing is a distinct possibility when the parts involved are small and thin in section. The diagram Fig. 5 illustrates the fundamentals of a continuous brazing set-up. Parts with braze metal in place are placed

on the rotating disc, which carries them over a heating coil located just below the disc. Brazing is accomplished during passage of the part over the coil. As the revolving disc carries the parts out of the heating zone, after the brazing has been completed, the parts are automatically removed by a scraper which projects over the disc. Hundreds of similar applications have been worked out, using belt conveyors, rotating tables, and so on.

Tool engineers have found induction brazing an extremely efficient method for the silver alloy brazing of tungsten carbide cutting tools. The tool shank and carbide tip are first processed to a good fit, then mated and brazed. Coil design should be as efficient as is possible, with the object of localizing the heat pattern to the areas to be brazed.

Copper brazing of tool tips has also been accomplished, using a controlled atmosphere to prevent oxidation and

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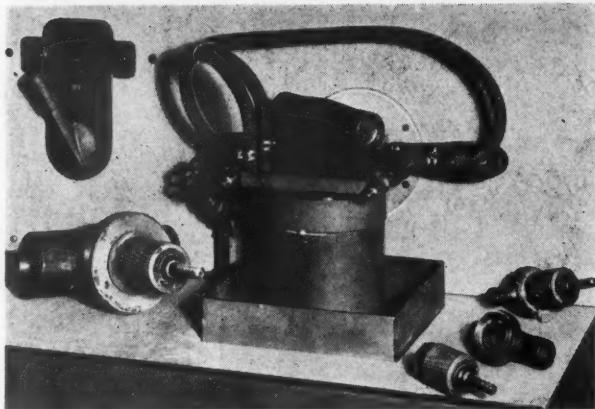


Fig. 7—Coil and Fixture for Silver-Brazing Soft-Soldered Sylphon Bellows in Steel and Monel Forgings.
(Induction Heating Corp. Photo)

scaling of the steel surfaces. A transparent canopy surrounds the heating coil and part components to provide for observation during processing, while hydrogen is fed under the canopy and burned as it emerges from an outlet orifice. Transparent quartz is an

ideal canopy material.

Any braze metal or solder may be used with the induction heater, although, as indicated above, when brazing temperatures will cause the steel parts to scale, the use of controlled atmosphere is necessary. Otherwise the steel mating surfaces will oxidize prior to flow of the braze metal, and a weak joint may result.

There are certain contingencies that must be recognized in brazing by induction. The coil should be designed

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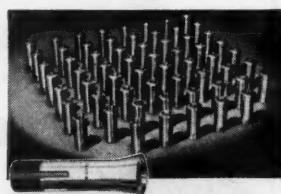


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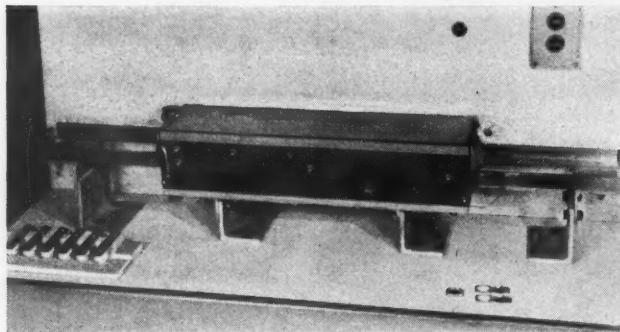


Fig. 8—Setup with Atmosphere Chamber, Coils and Fixtures Brazing Watch Cases
(Induction Heating Corp. Photo)

and stationed so that most heat will be generated in the part component of greatest mass. Heating coil designs should be kept as simple as possible, using one-turn coils when they will encompass sufficient area. The coils should be shaped to follow the general contour of the work, and should be kept from close proximity with sharp corners and other abrupt pro-

tuberances. All surfaces to be brazed must be brought to the correct temperature at the same time, thus preventing flow and chilling of the braze metal before the joint is complete.

Though joining and hardening are the two principle uses of the induction heater, the process is by no means limited to these applications. It would require volumes to describe in detail every use to which high-frequency heating has been applied. Representative uses are annealing, heating for

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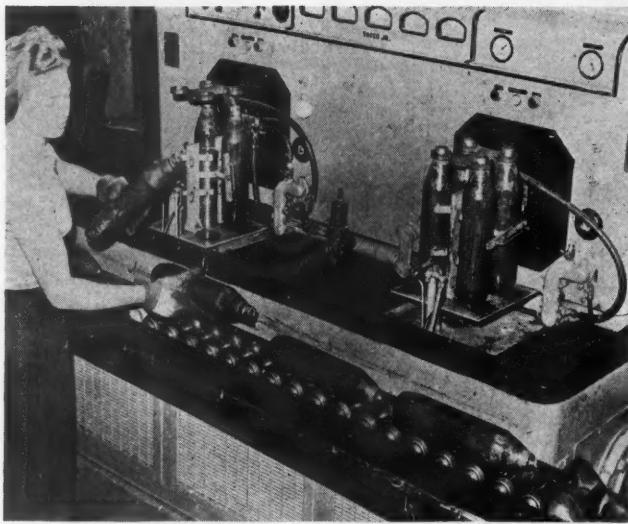


Fig. 9—Brazing Noses onto 88-mm Mortar Shells
(Ohio Crankshaft Co.
Photo)

a wall thickness of $\frac{1}{16}$ inch, and is heated back for a distance of $1\frac{1}{2}$ inches. But 30 seconds are required to bring the metal to the required 1850 deg. F. forging temperature.

The aerial bomb casings, which are fabricated from heavy steel piping, must be spun at 2300 deg. F. The ends of

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Another high heat application developed during the war was the drawing of steel cases. A slug is heated to 2000 deg. F. by induction, then, without subsequent heating, is subjected to two consecutive draws, the first draw to 4 inches in depth, and the final draw to a depth of 6 inches.

The above examples are illustrative

forging, flowing tin plate, sintering of powdered alloys, melting for casting, drawing and tempering, and heating for straightening.

The use of the induction heater for annealing and forging is increasing rapidly in scope. An excellent example is found in the production of 105-mm steel cartridge cases and aerial bombs.

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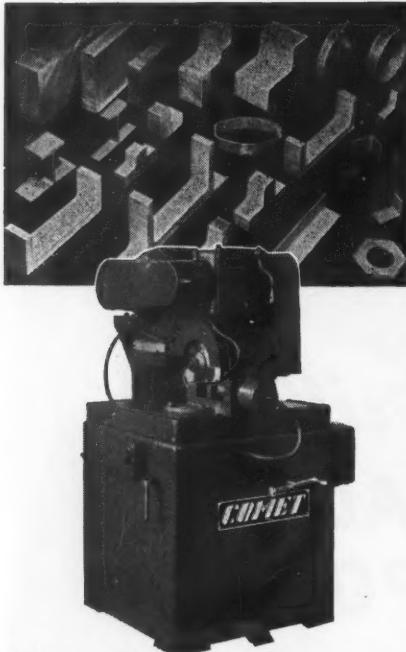
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(The second section of this article will be published in the May issue of MODERN MACHINE SHOP)

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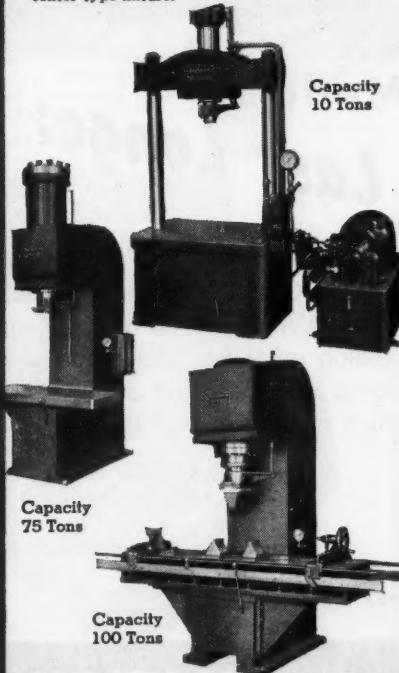
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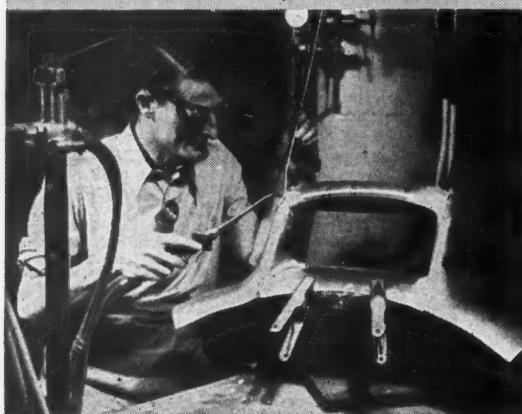
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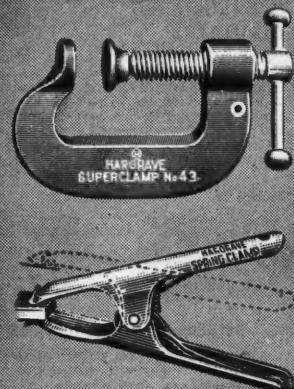
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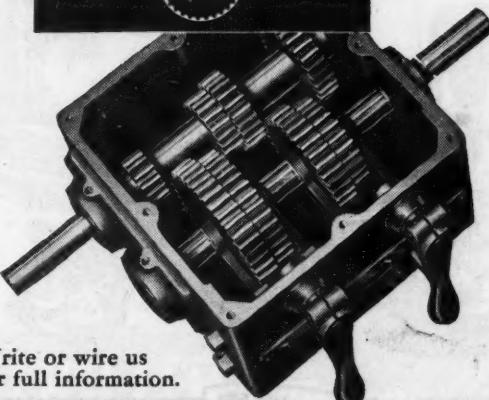
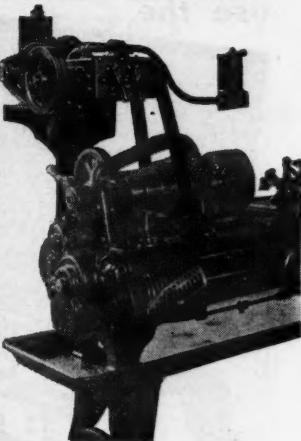
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will we give this job to?" asked the Shop Manager. "Both Brown and Jones seem to have the kind of production equipment to do the work."

"Production equipment, yes," answered the superintendent. "But how about their inspection equipment? How careful are they to keep their mikes and gages true? How do they check threads, tapers, gear tooth forms? Do they follow modern accurate inspection methods, or are they the kind of folks who depend on one little old set of gage blocks, pretty well worn, that they keep in the office safe and permit its use only once in a dog's age? They talk only about their production facilities, so I'm doubtful."

"Now take the Robinson people—a moderate sized shop, but these half-thousandths limits on our blueprints wouldn't worry them. They pride themselves on their complete inspection setup. I know they have a toolmaker's microscope, a projector for checking magnified images of threads and other forms, a set of good blocks that they use constantly, optical flats to check them for wear, and to check contact surfaces of mikes and gages. They have a binocular microscope too, and other equipment that all adds up to the fact that they talk our language on accuracy. They call their setup a **SCHERR LIMITED BUDGET INSPECTION LABORATORY**, and Robinson told me it didn't cost too much and has saved its cost many times over."

The Manager thought a moment, then said, "Tell Robinson to come over."

* * *

Moral: Sell your shop not only on the basis of its production capacity, but also on its inspection facilities. Your strongest sales aid is a **SCHERR LIMITED BUDGET INSPECTION LABORATORY**.

THE SCHERR *Limited Budget* INSPECTION LABORATORY

1.—**SPENCER BINOCULAR MICROSCOPE** gives three-dimensional vision—the very way to inspect surface finish, scratches, imperfections, etc., impossible to detect with simple plane views. Price, \$115.00.

2.—**ULTRA CHEX GAGE BLOCKS** accurate within .000005". A series of blocks for building the necessary standards of the inspection shop. Large and small sets, \$125.00.

3.—**SCHERR MAGNETIC LATHE** requires work under inspection and tooling. Price, \$115.00. Dial rest, \$27.50. Total, \$142.50.

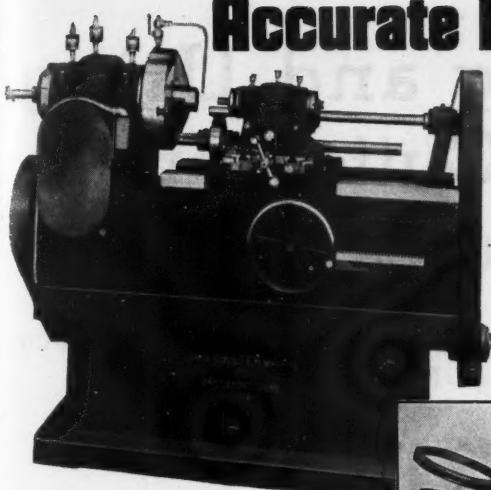
4.—**SCHERR COMPARATOR** gives clear, magnified reading vision. 1/10,000". Checks sizes, thicknesses, angles, etc. Price, \$195.00.

5.—**THE WILDER PROJECTOR** throws a magnified image at 100' on a master scale. Inspectivity showing any deviation from accuracy. Used for positive check of all forms—lengths, widths, gages, threads, gears, magnifications 10x to 100x. \$248.75.

6.—**GAERTNER TOOLMAKER'S MICROSCOPE** magnifies visual inspection of small part profiles in magnified projection. Permits direct measurement in two dimensions and angular measurement by optical protractor.

7.—**OPTICAL PARALLELISM** and the method of light wave interference to check parallelism and perpendicularity of surfaces. Small parallel, \$10.00. Set of 2, \$25.00. .0125" apart for micrometer inspection, \$25.00.

With these super-accurate inspection tools, any shop can have accuracy standards up to those of the largest plants in the country. You will be interested in details on any or all of this equipment. Write or



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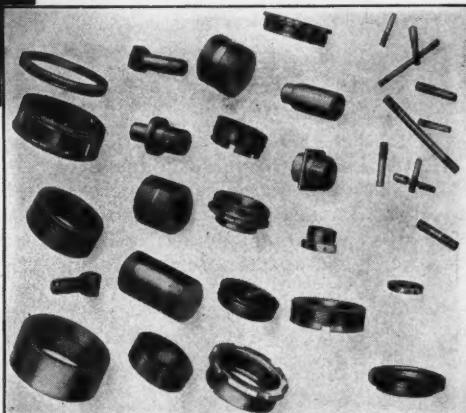


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specifications

RIGHT OR LEFT HAND

THREADS

INTERNAL OR EXTERNAL



Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures...can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of feeds and speeds.

The James COULTER Machine Co.
BRIDGEPORT • CONNECTICUT • U. S. A.

Designing and Using Milling Cutters and Fixtures, VI

Advantages of Index Bases — Fixtures for Straddle-Milling — Swing Milling—Milling Cam Lobes

By C. W. HINMAN
Designing Engineer

ONE of the inherent advantages of the milling machine is the ease with which production can be increased by the application of various types and kinds of attachments. No other type of machine tool affords this ad-

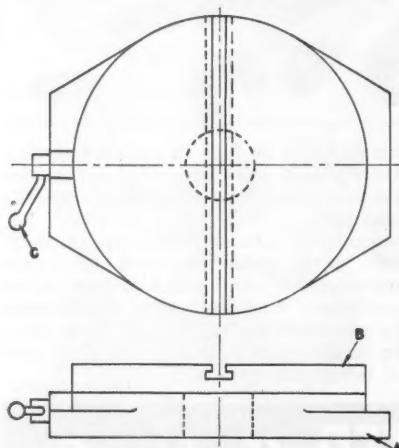
vantage in such a surprisingly large degree. For instance, the Brown & Sharpe Manufacturing Company makes more than 30 kinds of standard attachments which are applicable to the several types of standard milling machines. Several other manufacturers also market milling machine attachments in a variety of types and sizes.

Many of these attachments can successfully be used on other kinds of machine tools. This fact is particularly true as regards planers, lathes and drill presses, and some of the circular indexing tables can be used on any standard jig boring machine. While some of the attachments were primarily designed for toolroom milling, many of the others can be used in the quantity production of duplicate parts for interchangeable manufacturing. Therefore when the production executive is confronted with difficult milling problems, he will be wise to investigate the production possibilities of these ready-made attachments.

Indexing Bases

Index bases were developed as a nat-

Fig. 37—Drawing Showing General Design of an Index Base which when used as an Attachment on a Milling Machine, aids in increasing output. This is only one of several designs.



ural sequence to the introduction of semi-automatic milling. An index base is a standard attachment with which "non-cutting" milling time can be reduced to a minimum. Originally designed for use on plain milling machines for automatic and semi-automatic operations, the index base can also profitably be used on the tables of other types of machines.

A drawing of one of the simpler types of index bases is presented in Fig. 37. The heavy base-plate A, which is the body of the attachment, is designed so that it can be anchored to the machine-table. Mounted on the base-plate is a swivel-platen, of lighter construction and designed to revolve on a center bearing through a 360-degree arc. A working position can be established at any point on the circle, the trip-lever C being used to secure the platen B at any point required by the operator. The top surface of platen B is provided with one or more

tee-slots to serve as anchorage for a milling vise or fixture.

This attachment is important for use on jobs where the loading time and cutting time are approximately equal. A fixture can be set up on each end or the index base, or two index bases can be used so that, while the work in one fixture is in process of milling, the other fixture can be unloaded and reloaded with new work.

When the movement of the table returns the fixture to its normal loading position upon completion of the cut, the plate is indexed to bring the fixture at the opposite end into working position and the machine is then put into operation. The finished work is removed from the fixture in which the last cut was made and the fixture is reloaded for the next operation cycle.

The application of the index base principle has many variations. The base can be designed to facilitate milling the work on two or more of its

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FOR TUBE SLOTTING, TUBE
SHAPING AND CUTTING FLAT
SHEETS BY TEMPLATE OR TO
A SCRIBED LINE

Rugged construction — Ease of control — Simplified operation — Mechanical feed — Low upkeep — Accurate.

Cutting Capacities:

Flat mild sheets $\frac{3}{4}$ "
Tough alloys $\frac{5}{8}$ "

MODEL
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Tubing:

Wall thickness to $\frac{1}{8}$ "
1" I.D. to 36" O.D.

Tube cutting
Attachment

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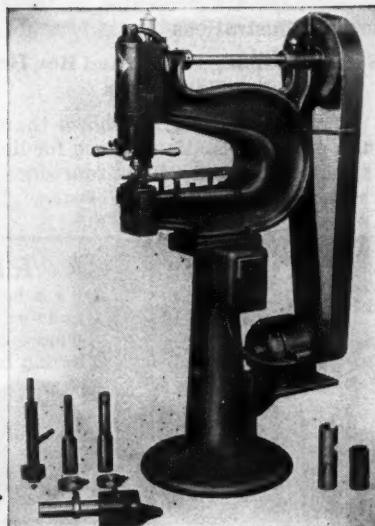
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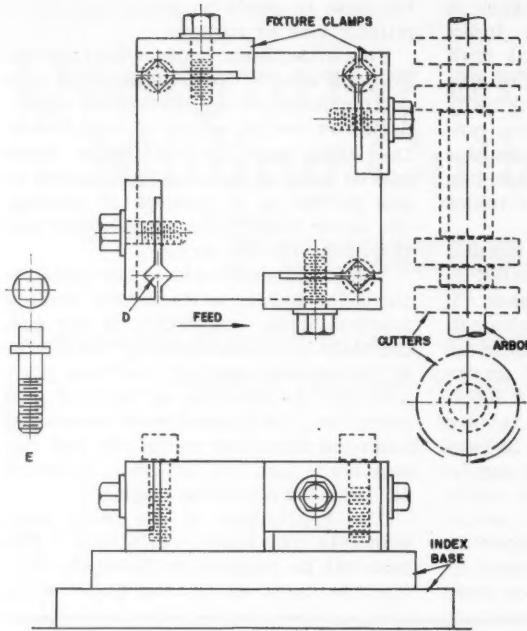


Fig. 38—Fixture mounted on an Index Base for Straddle-Milling, in one operation, the four sides of the collar-screw-head shown at E

sides, or on the top and sides. A few of the outstanding advantages of this attachment are presented in the following illustrations.

Straddle Milling Square and Hex Head Collar-Screws

The drawing Fig. 38 shows the design of a four-station fixture for holding, indexing, and milling four sides on the heads of steel screw blanks. The

blanks are produced in an automatic screw machine. The fixture is mounted on an index base anchored to a milling machine table, and two pairs of halfside milling cutters are positioned on an arbor for straddle-milling the work.

This setup produces one completed screw - head at each pass of the cutters. The index base and fixture are revolved 90 degrees after each cutting cycle. One finished piece is removed at position D and another blank is inserted while the two pieces at the right are being milled. A finished piece is seen at E.

From the setup shown here it is obvious that, by using a similar six-station fixture and three pairs of straddle mills and indexing the fixture to 60 deg. hexagon heads can also be milled. A pair of sides on each of the heads is milled at each pass of the cutters, and one screw head is completed in the process of each cutting cycle. Thus,



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.

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EG103 SPECIFICATIONS

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Workhead Accommodates—Collets 1" Max. Hole
—Chucks & Face Plates 4" Max.
Floor Space & Wt. 45" Long x 25" Wide—1600 lbs.

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PLAINVILLE, CONNECTICUT



then he said to himself:

"Beat their brains IN...not out"



AGED Japanese Diet member, YUKIO OZAKI, lifelong champion of parliamentary government, recently called upon his colleagues to resign rather than persist in blind obedience to government. Said he:

"Our people of today do not know right from wrong. We must pour into their heads the law of humanity and the difference between right and wrong."

The difference between the right way of doing things and the wrong way would seem an easy thing to knock into heads,

—but even here in America it sometimes takes KNOCKS like that of the SHERIFF to awaken interest;

—while with others the gentle KNOCK of OPPORTUNITY spurs them to deeds for the good of all.



The difference between **RIGHT** and **WRONG** . . . he says

LOOK, OZAKI . . . Here is the difference between **RIGHT** and **WRONG** in manufacturing a bracket such as shown:

WRONG:



Cost 13¢ each
of conventional construction.

RIGHT:



Cut 1 piece of 6" x 1½" x ¼" strap. Drill holes in ends. Bend in U.

Cut 1 piece of 6" x 2½" x ¼" strap. Drill holes in ends. Bend in U.

Fit up in jig and weld on both sides.

Cost 8¢ each
of welded steel.

DIFFERENCE: Saved 5c Each

This bracket, 10 of which are used on each harrow, is typical of many parts changed over to welded design by an implement manufacturer. Perhaps your product has similar parts. The Lincoln Engineer will gladly help you study the possibilities of welded design as applied to your problems.

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ARC WELDING



Fig. 39—Index base of "Cincinnati" Type. The lever in the foreground operates the plunger that locks the swivel-platen after revolving it end for end. The Swivel-Platen is supported at the center by a ball bearing which facilitates the reversing movement when the platen is heavily loaded.

by removing the finished work and re-loading while the cut ahead is in process, the non-cutting time is reduced to a minimum.

It is easy to see that the principle thus outlined can be applied for the milling of squares on crankpins, for cutting grooves or slots, for milling yokes, or for taking top and side cuts simultaneously. Surprisingly high production can be obtained with these inexpensive fixtures.

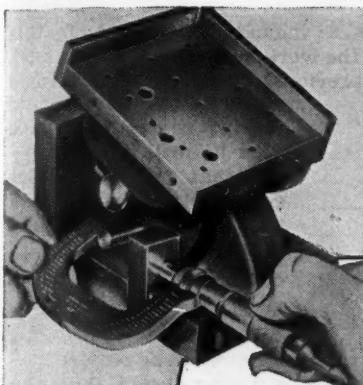
Boring Holes on an Index Base

An index base manufactured by the Cincinnati Milling Machine Company is shown in Fig. 39. This company makes several types of index bases and

holes can accurately be spaced and bored. A good example of such work, consisting of a pump part in which two 1.7865-inch holes have been bored, is shown in Fig. 40.

The machine used for this job is a Cincinnati Vertical Dial-Type Milling Machine, and the work was secured in a fixture centered and anchored on the index base shown in Fig. 39. However, the work-holding fixture is located on the base so that the two holes to be bored are concentric with the center of the ball bearing swivel-platen.

After the first hole has been bored, the operator simply swivels the index base, clamps it, and bores the second hole. In this case the indexing is, of



The Bemisine SINE-ANGLE PLATE

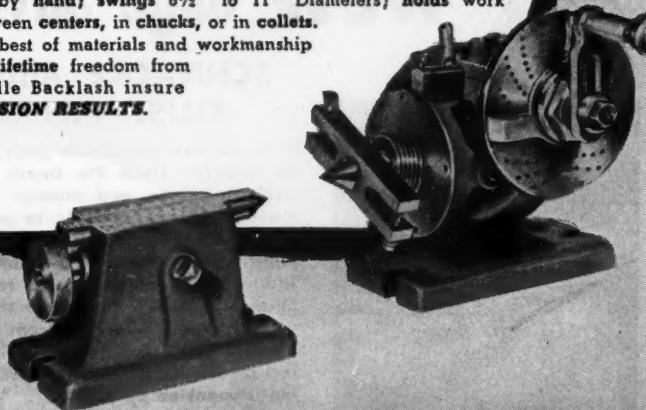
speeds up and simplifies setting any angle from 0 to 90° — using only a 2" micrometer. Faster than a sine bar or protractor — converts set-up time to production time on Surface Grinders, Jig Borers and Millers.

(Also used with standard gage blocks.)

The Ellis DIVIDING HEAD

A **VERSATILE** unit that tilts and swivels, indexes by crank or by hand; swings 6½" to 11" Diameters; holds work between centers, in chucks, or in collets.

The best of materials and workmanship and lifetime freedom from Spindle Backlash insure **PRECISION RESULTS.**



NICHOLS-MORRIS CORPORATION
44-A CHURCH STREET, NEW YORK, N.Y.

course, through 180 degrees. On this job extreme accuracy was of paramount importance because the bore

work, as indicated in Fig. 41. In this case the workpiece, which is cast iron, has previously been machine-finished on its bottom surface and the two center holes have been jig-drilled. It is obvious that the workpiece could not be swung in a lathe in order to finish the arcs; consequently some other method had to be devised. It is also evident that some type of milling fixture will be required. As a matter of fact, these two arcs could be milled by using a formed milling cutter with teeth of the same shape and width as the arc, but the cutter would

of necessity be of special design and too expensive for the milling of only a few hundred parts.

The drawing Fig. 42 illustrates a

Fig. 40—Drawing of Pump part in which two large holes are to be bored.

must be square and parallel within 0.001 inch in 6 inches.

It often becomes necessary to mill circular arcs from a center-hole in the

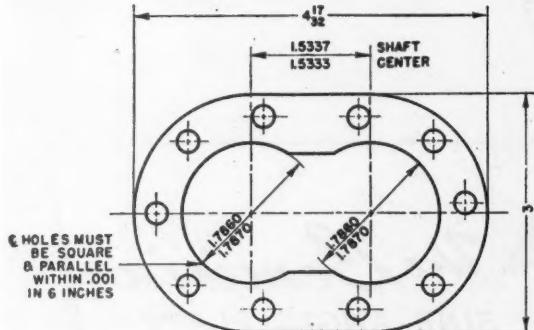


Fig. 40—Drawing of Pump part in which two large holes are to be bored.

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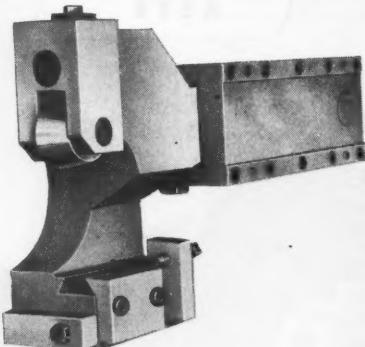
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ADVANTAGES:

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Eliminates inaccuracies of machine and stock
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3. Functional Design—less bulk—
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Equip your screw machines with C & T Shave Tool Holders and increase production

Write for circular and prices.
State make and model of automatics.

C. & T. Tool & Die Company

30 Sherman Court, New Britain, Conn.

low-priced fixture with which these arcs can be milled in a jiffy. The hole in the work is placed over a stud, and the work is held down by hand. While the arc is being cut with the side teeth of a milling cutter, the work is swung by hand from position **B** through **C** and **D**, at which latter position the arc is completed. The "feel" of the cutter on the work indicates to the operator how fast the piece can be swung and

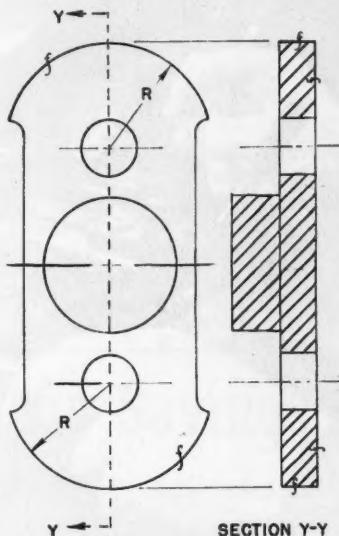


Fig. 41—Sample of work so designed that two end arcs are required to be finished on a cast iron workpiece in a "Swing" Milling Fixture.

fed to the cutter. The direction of rotation of the cutter-teeth, being down against the work, helps to hold the piece in position.

The illustration presented in the preceding paragraph is preliminary to a discussion of a fixture for milling spiral rises on cam lobes. In using both of the fixtures shown in Fig. 42 and 43 the work is fed by hand.

Figure 43 illustrates an easily-operated tool for milling spiral rises on the

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JAW pressure is applied downwards and sideways. It may be set at any angle on the table and held by the T-slot bolt. Then LOCK.

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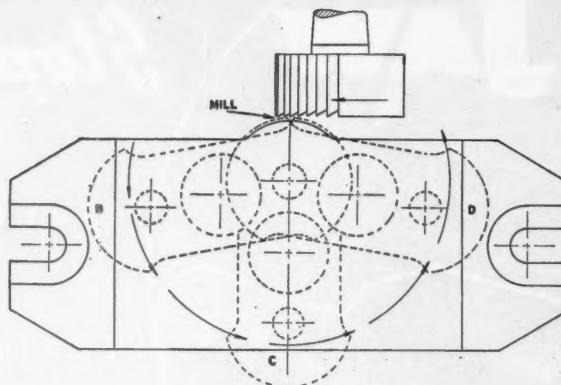


Fig. 42 — Drawing showing simple design of "Swing" Milling Fixture in which the arc-ends on the workpiece shown in Fig. 41 are finished.

edges of cam lobes. Here is a fixture that is simple in design and cheaply made, and which, with the aid of commercial change gears, covers an infinite range for milling cam leads. There are no extra parts to handle. Plain arcs, as shown in Fig. 41, can also be milled by simply "unmeshing"

the idler gear. This fixture may well be called "semi - universal" because a little study will reveal the adaptability of the tool for performing several other milling operations.

The drawing is a schematic presentation of the mechanical principles involved in the design of the tool. The cast iron fixture body is indicated at A; B is the work carriage, C the worm-wheel, D the worm (right-hand type), E the round drive shaft, F, hand-crank, G, right-hand thread leadscrew, H, driving sleeve, I, the idler bracket.

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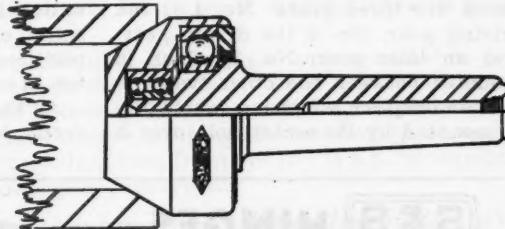
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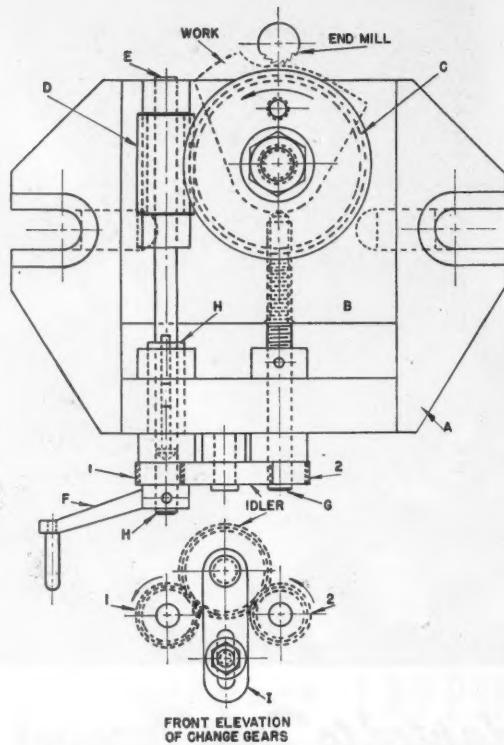


Fig. 43—Drawing of proposed Semi-Universal Fixture for milling the edges of cam lobes. Carriage B is guided in a dovetail slide (not shown)

central stud, where it is held by a washer and clamping nut. The blank rests on a plate that it attached to the wormwheel. A dowel pin, shown in the drawing, prevents the work from slipping. When crank F is revolved in either direction, two movements are produced in the work simultaneously: (1) the wormwheel and work are revolved by the revolution of worm D, and (2) the carriage and work advance to or recede from the cutter, depending upon the direction in which the crank is revolved. These movements cause the cutter (in operation) to cut a spiral rise either up or down on the cam lobe, depending upon the direction of movement of the crank.

The cutter used on this operation is a spiral end mill, and the work is so positioned that the side cutting teeth are in contact with the work.

As shown in the drawing, when the crank is revolved counter-clockwise,

There are three gears: No. 1 is the driving gear, No. 2 the driven gear, and an idler gear, No. 3, which is mounted between the other two.

The workpiece, which is a cam blank, is mounted by its center hole over a

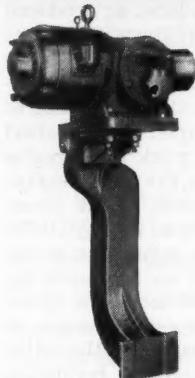
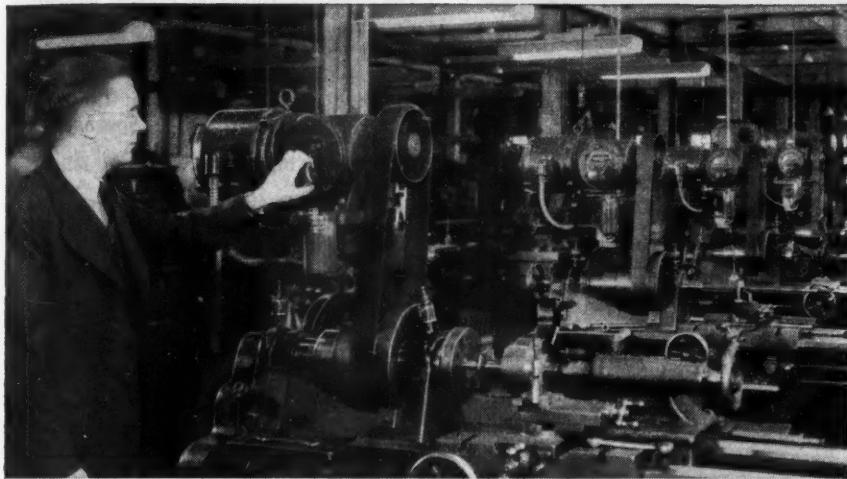
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the carriage and work recede, carrying driving shaft **E** along with them. However, the driving shaft is a sliding fit within sleeve **H** and the two parts are keyed together so that they both revolve when crank **F** is operated.

Computing the Lead and Rise

In a single-thread worm, the circular pitch of the gear-wheel and the linear pitch of the worm are equal; therefore the gear-wheel revolves one tooth for each revolution of the worm. The following computations are based on that fact, and also on the fact that gears (1) and (2) have the same number of teeth, which simplifies the computation. The lead of a cam lobe is the amount of its rise in one complete revolution of the cam.

The lead of a cam lobe, as produced in this fixture, is as follows: The number of teeth in the gear-wheel **C** times the linear pitch (in inches) of the leadscrew thread equals the spiral lead of the cam-lobe. Example: If gear-wheel **C** has 30 teeth, the work will revolve 12 degrees each time the crank makes a full revolution. And if the linear pitch of the leadscrew is, say, 0.050 inches, then at each revolution of the crank the spiral cut on the work develops a rise of 0.050 inches in 12 degrees, or a lead of 30×0.050 inches, or 1.500 inches in 360 degrees—the latter representing one complete revolution of the work. In other words, the lead equals $N \times L$, in which **N** is the number of teeth in gear-wheel **C** and **L** the linear pitch of the leadscrew thread. In the example given, $30 \times 0.050 = 1.500$ inch lead. But this result is obtained only when the numbers of teeth in gears (1) and (2) are equal.

In order to substitute new values in the formula, **N** can be decreased by using a double, triple or quadruple thread on the driving worm. Gears (1) and (2) can be exchanged for other gears having various numbers of teeth. Therefore, when using a single thread

"ROCKWELL" HARDNESS TESTER

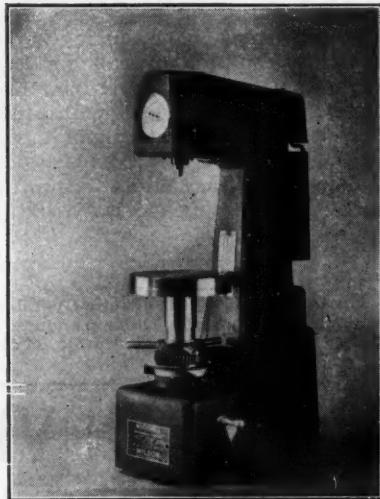
"A Miss Is As Good As A Mile"

That is terribly true
when shooting
for accuracy
with either a gun
or a hardness tester.

WHILE a machine to do work may be still worth a lot though it is 5% off in efficiency, that is not true of a hardness tester.

Parts are tested for hardness nowadays with the idea of rejecting them if they are one or two points of hardness off from specifications. Would you want to pass pieces that should be rejected—or reject pieces that really are of proper hardness?

Experience has shown that second hand testers have generally been so badly deranged through wear, rust, neglect, bad handling or shipment as to be worse than useless unless more is spent on them for rebuilding than old types are worth. Remember that one point of hardness on the "ROCKWELL" Tester means a difference in depth of indentation of only .00008".



An Associate Company of
American Chain & Cable

WILSON
MECHANICAL INSTRUMENT CO., INC.
369 Concord Avenue, New York 54

on the worm, if the number of teeth in gear (1) divided by the number of teeth in gear (2) is represented by Z, then the lead is $N \times L \times Z$. By revolving the crank in the opposite direction from that indicated in the drawing, the rise on the cam will be milled down instead of up.

If this fixture is used on a vertical miller with a two-lipped end mill, a cam slot can be cut in the face of the work. Further changes can be made by using multiple threads on lead-screw G. In fact, a great many formulas can be developed with study. Thus it is obvious that an infinite variety of tasks can be accomplished by making a few easy alterations in this simple little milling accessory.

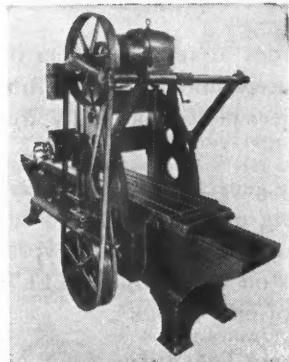
Logan "Rotocast" Hydraulic Cylinders. A 32-page illustrated catalog announcing standard "Rotocast" Hydraulic Cylin-

ders and containing helpful engineering data is now being offered by the Logansport Machine Co., Inc., 901 Center Ave., Logansport, Ind. The catalog describes engineering developments and advanced features of the new line and includes mechanical drawings of the seven standard mounting types. In addition, the catalog provides complete specifications and engineering data on the various available cylinder types, suggests methods of application, and presents helpful information for designing hydraulic circuits. Moreover, the catalog illustrates accessory equipment which permits improved performance in certain applications, as well as coordinated units for making up complete hydraulic circuits.

Copy of Catalog 84 is available free to mechanical executives addressing requests on their company letterheads.

Cratex Rubberized Abrasive Wheels and Points for fine grinding and polishing are illustrated, described, and tabulated as to dimensions, grades, and prices in a six-page catalog prepared by the Cratex Manufacturing Co., 81 Natoma St., San Francisco, Calif. Copy free upon request.

MASTERDRIVES for PLANERS Eliminates Lineshafting



Now you can have added flexibility in plant layout, because Masterdrive eliminates lineshafting and permits placing planers wherever you wish.

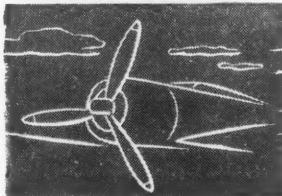
The drive is supported by four supports. Each of these require the drilling and tapping of four holes. Once supports and horizontal bars are in place, motor base and outboard bearing support can be moved laterally to line up with pulleys. Your present ceiling lineshaft pulleys are used on the motor counter shaft.

A single complete installation with Masterdrive — one responsibility. Write today for details of planer or other Masterdrive applications.



MASTER ELECTRIC CO.
INDUSTRIAL EQUIPMENT DIVISION • DAYTON, OHIO

CUT
MILLING
COSTS
with
MELIN
3-FLUTE
END MILLS

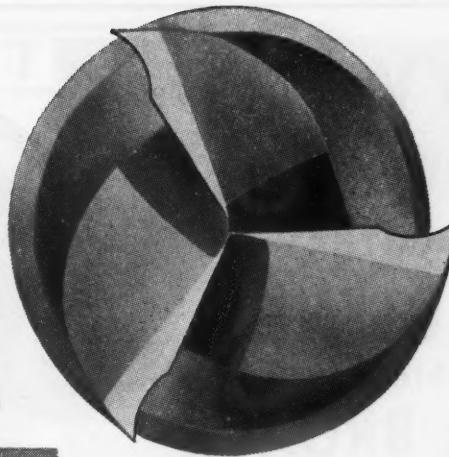


PERFECT BALANCE—Everyone knows that the 3-blade principle achieves perfect balance in airplane propeller design. This same $\frac{360^\circ}{3}$ formula guarantees perfect balance in the new Melin 3-FLUTE End Mill!

Standard or Specials from $3/32''$ to $2''$ sizes.
Available in 2, 3 and 4 Flute.

Write for New Complete Catalog.

MELIN TOOL CO.
1331 PHILLIPS ST., S., GRAND RAPIDS 7, MICH.



**HOG
AND
FINISH
WITH THE
SAME
TOOL**

**MELIN Gives You
These Advantages:**

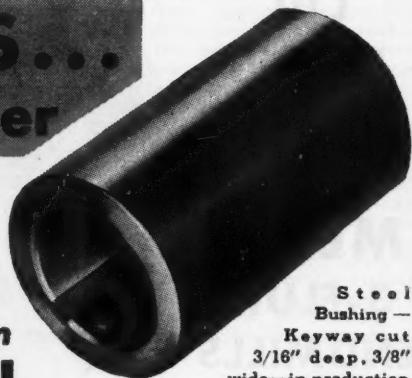
- 1—FASTER CUTTING
- 2—SMOOTHER FINISHES
- 3—MORE CHIP ROOM
- 4—LONGER LIFE
- 5—EXTRA STURDINESS
- 6—PROPER HOOK RAKE
- 7—INCREASED PRODUCTION
- 8—LESS COST

KEYWAYS... 10 Times Faster

WITH
THE GLENNY
adjustable-expansion
Push BROACH

Maintains $\pm .0005$ Accuracy

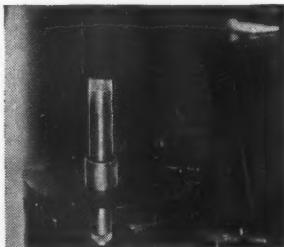
Broaches slots of greatest accuracy to an average length of five inches and up to 5/8" widths. May be used on Arbor Presses, Lathes, Screw Machines and other equipment.



Steel
Bushing —
Keyway cut
3/16" deep, 3/8"
wide—in production
quantities.

10 TIMES FASTER THAN ORDINARY METHODS

The bushing illustrated was slotted with a Glenny Broach in one-tenth of the time required by a shaper for the same operation. Full information in Bulletin 9. Send for it today.



Glenny Broach in use on
an Arbor Press



Glenny Broach in series with
other tools for multiple oper-
ations on a Turret Lathe.



Patent
No. 2,184,383

* * * * *

Dept. B EAST SHORE MACHINE PRODUCTS CO.

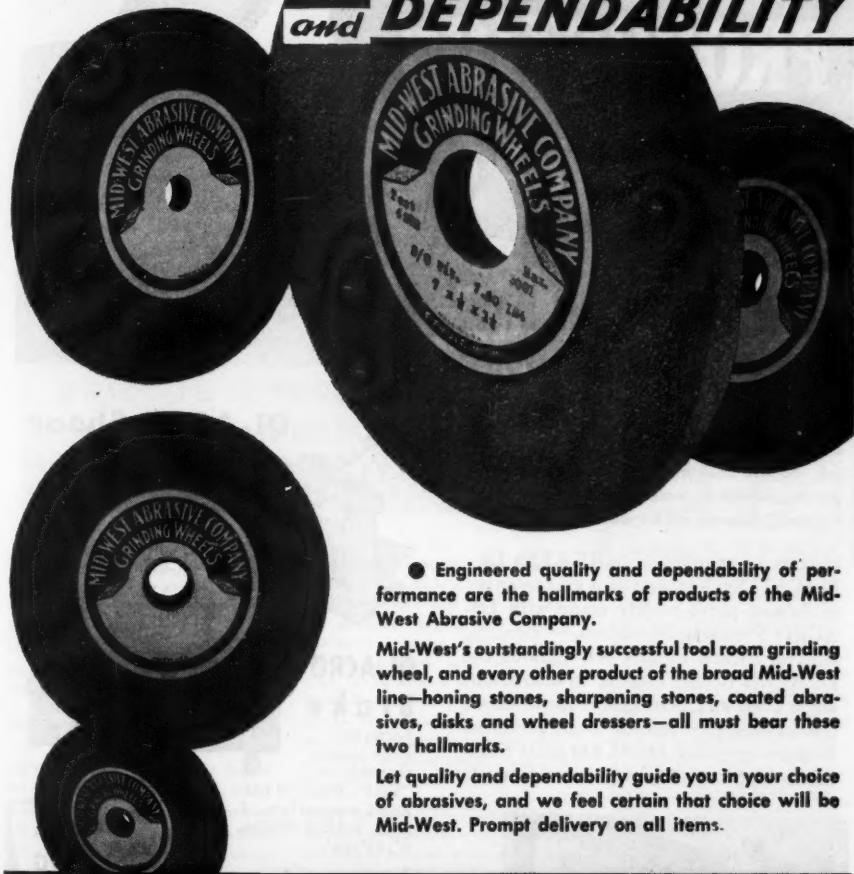
835 East 140th Street



Cleveland 10, Ohio, U.S.A.

QUALITY

and **DEPENDABILITY**



● Engineered quality and dependability of performance are the hallmarks of products of the Mid-West Abrasive Company.

Mid-West's outstandingly successful tool room grinding wheel, and every other product of the broad Mid-West line—honing stones, sharpening stones, coated abrasives, disks and wheel dressers—all must bear these two hallmarks.

Let quality and dependability guide you in your choice of abrasives, and we feel certain that choice will be Mid-West. Prompt delivery on all items.

M I D - W E S T A B R A S I V E C O .

Manufacturers of **DEPENDABLE** Abrasives

Owosso, Mich.

Detroit

Rochester, Pa.

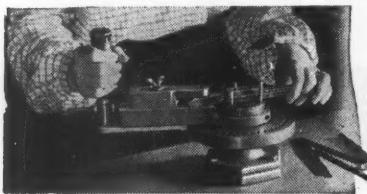


Talk About PRODUCTION Without DIES!

**4,000 PARTS per DAY
with DI-ACRO Bender**

"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

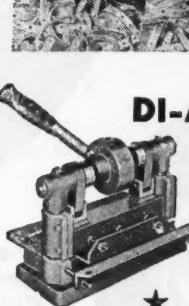
Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



DI-ACRO IS PRONOUNCED "DIE-ACK-RO"

O'NEIL-IRWIN MFG. CO.

306 EIGHTH AVE. SOUTH • MINNEAPOLIS 15, MINNESOTA



DI-ACRO Shear

Squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. 3 sizes. Shearing widths, 6", 9", 12".

DI-ACRO Brake

Forms non-stock angles, channels or "Vees". Right or left hand operation. 3 sizes. Folding widths, 6", 12", 18".



Send for Catalog

showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DUPLICATING".



A VERSATILITY FEATURE OF THE
GREENLEE "6"
 AUTOMATIC SCREW MACHINE

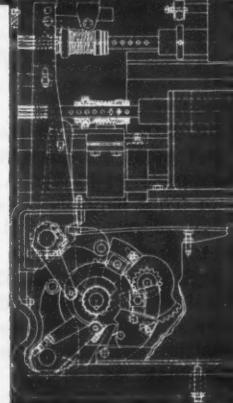
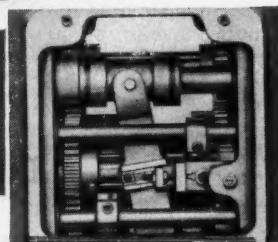
BUILT-IN THREADING AND TAPPING MECHANISMS FOR FOUR POSITIONS

CONVENIENTLY LOCATED. The gear box (1) and the threading box (2) contain the built-in drive and feed mechanism available as standard equipment on the GREENLEE "6" for any desired threading, tapping, or reaming operations in the 3rd, 4th, 5th, and 6th positions.

HANDY FOR SET-UP. Removing the cover of the gear box (1) gives access to the duplex clutch and shifting lever and to the trip collars on the control rods. Taking off the cover on the threading box (2) permits quick access to the adjustable forward feed and return cams which govern the travel of the threading spindles. Other adjustments are in the open tooling area.

VARIETY OF WORK. A broad range of settings are available at all adjustment points to handle a wide variety of standard threading, tapping, and reaming operations. Special threading and tapping equipment, with lead screw drive, can be supplied when needed for high-precision work. Also, double clutches can be furnished for simultaneous right-hand and left-hand threading. A sensitive threading spindle is available for cutting fine delicate threads.

OTHER FEATURES. The GREENLEE "6" has many other features which contribute to efficient, accurate work and quick change-over. Write for a copy of our 20-page descriptive bulletin "Greenlee Automatic Screw Machine" today and learn why the GREENLEE "6" is often called "The Operator's Favorite".



GREENLEE BROS. & CO.
 1884 MASON AVE., ROCKFORD, ILLINOIS

WRITE TODAY FOR MORE FACTS

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES



Public Auditorium, Cleveland, Ohio

5th A.S.T.E. Convention and Exposition

Public Auditorium, Cleveland, Ohio

April 8 Through 12, 1946

THIS fifth—and by far the largest and most comprehensive—Exposition sponsored by the American Society of Tool Engineers is scheduled to open its doors at the giant Cleveland Auditorium, April 8th and will run through Friday, April 12th.

Built around the annual convention of the A.S.T.E., officials say that the exposition will cover the widest range of products of interest to production engineers yet offered at any one time in the history of U.S. industry. A quick count of the scheduled exhibits indicates that a total of some 400 different classes of products will be on display at the exposition, with reports from exhibitors still incomplete.

Products to be shown thus will include virtually every basic classification with which the Tool Engineer has to deal in determining production methods and equipment to produce better peace-time products at lower cost. Many of the items to be exhibited will be entirely new, representing, as they do, war-time developments not previously displayed to the industrial "public."

In general, the key to the exposition—as well as the technical sessions of the A.S.T.E. convention—will be "How to produce goods at lower cost while industry is paying higher wages to the men who produce the goods."

Typical of the attention to cost-

saving and time-saving production methods and tools are the considerable number of exhibits which deal with power-operated hand tools—running the gamut from screw - drivers to brushes—and the large number of exhibits featuring cemented carbides. The latter represent the single largest class of products, appearing in no less than 17 separate company exhibits, with powered hand-tools (electric, pneumatic and hydraulic) featured in 15 exhibits.

Machine tools are not neglected. They run the full range of mechanical and hydraulic presses, lathes of all types, drill presses, tapping machines, milling machines, automatic and hand screw machines, gear hobbers, sawing machines, internal and surface grinders, hydraulic riveters and punchers, resistance welding machinery, broaching machines, precision boring machines, centering machines, honing machines, shapers, injection molding machines, and so on.

Of particular interest also will be the numerous exhibits featuring quality control. Faster and higher-precision checking devices including electronically operated gaging devices and others which register by sound rather than visually, are to be found in this general classification of products and methods. Latest developments in chip disposal equipment, materials handling equipment, air compressors, pumps of all kinds, all electric variable speed machine drives, heat treating furnaces, "white" blue-printing equipment capable of turning out prints at 30 feet a minute, lubricants and coolants, etc., will also be on exhibit.

Technical Sessions

"Cost saving" will be the general theme also of all technical sessions in recognition of the fact that the biggest job the Tool Engineer has to face today is how to make it possible to

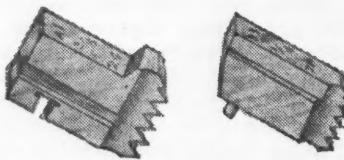
produce all kinds of goods at lower cost at the same time that manufacturers are paying higher wages to labor. Scheduled for afternoons and evenings during show week they will cover subject matter ranging from "Plant Layout" to "New Techniques in Cutting Tools," and from "Quality Control" to "Tool Engineering for Profit."

Monday afternoon's session under the chairmanship of Stephen Urban, Pratt and Whitney Division, Niles Beament Pond, Syracuse, New York, will delve into the subject of controlling quality, not only as to dimensional tolerances but also as to physical characteristics and the economics of quality control from both standpoints.

This session will be followed Monday evening by a symposium on Plant Layout and Materials Handling as it affects and is affected by Tool Engineering. This session will be under the direction of W. B. McClellan, Gairing Tool Company, Detroit, Mich.

What the Tool Engineer should know about coolants will be the general topic of Tuesday afternoon's session under the chairmanship of Fred J. Schmitt of D. A. Stuart Oil Company, Chicago. This will be followed by a symposium on "New Techniques in Cutting Tools," Tuesday evening, with Richard W. Ford of Kearney & Trecker Corp., Milwaukee, Wisconsin, as Chairman.

Simultaneous sessions on Wednesday afternoon will be devoted respectively to (a) Tool Engineering Education, with ASTE Educational Committee Chairman Otto Winter presiding, and (b) Tooling for Permanent Molds and Extrusion. The latter session will be under the chairmanship of Earl V. Johnson of Firth-Sterling Steel Co., Dayton, Ohio, and will deal with the subject from the standpoint of the product involved, the tooling required and uses of the processes. The second half of the Educational session will be



CHASERS

(Made by the People Who Know How)

THAT GET YOU INTO
PRODUCTION

Faster

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Longer

GIVE MORE PARTS

BETTER THREADS

LONGER LIFE

Order NOW

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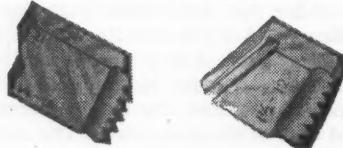
MILLED or GROUND THREADS

CHASERS for all makes of
general purpose Die Heads
and Collapsible Taps

WRITE FOR CATALOG M

Chambers Chaser Co., Inc.

13-19 W. Woodruff St.
Hazel Park, Mich.



held Wednesday evening.

A single technical session is scheduled for Thursday, since the annual banquet is to be held Thursday evening. This afternoon session will deal with "Tool Engineering for Profit," a symposium on determining how to engineer production methods and equipment to produce a given number of parts at minimum cost. Chairman of this session is H. E. Linsley, Technical Editor, the Iron Age.

A single session on Friday afternoon will wind up the technical program. This session, under Roland E. Lockridge, National Automatic Tool Co., Inc., Richmond, Indiana, will study the subject of special machine design as affected by use of different types of machine controls. Thus, the influence on such designs of hydraulic, electronic and mechanical controls will be discussed.

Afternoon sessions are all scheduled to start at 2 P. M. with evening sessions starting at 8 P. M.

Motion Pictures

A highlight of the A. S. T. E. Exposition and Convention will be the showing of technical motion pictures each day of the show in a special theatre in the Cleveland auditorium. These films will deal with all types of Tool Engineering and related problems. Different films will be shown each morning of the exposition between 11 A. M. and 1:15 P. M.

Plant Visits

As usual in connection with A. S. T. E. conventions, arrangements are being made for members of the technical society and other qualified visitors to the show to inspect a considerable number of Cleveland and vicinity plants in operation. Such plant visits are scheduled morning and afternoon daily from Tuesday to Thursday inclusive, and on Friday morning.

GREEN
"GO"

RED
"NOT GO"

REVOLUTIONARY NEW WOODWORTH THREAD RING GAGE

**"It Starts round and Stays
round with every adjustment!"**

The new Woodworth Adjustable Thread Ring Gage offers many sensational improvements over those of conventional design.

Proven by actual tests to be mathematically round through the full range of adjustments, its revolutionary design permits a degree of accuracy in thread inspections never before obtained.

Step up your production—reduce your manufacturing costs—with this new Woodworth instrument of accuracy.

5-PLUS FEATURES

- 1 GREATER ACCURACY AND STABILITY
- 2 LONGER WEAR LIFE
- 3 LESS WEIGHT
- 4 POSITIVE IDENTIFICATION
- 5 POSITIVE ADJUSTMENT

ACCURACY YOU CAN TRUST

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N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN
Precision Gages • Precision Machine and Aircraft Parts • Diaphragm Chucks • Adjustable Clamping Jigs • Special Tools

Accommodations

In view of the housing shortage, extensive preparations for accommodating the many thousands of visitors are being completed, through the National Headquarters' office of the Society, the Cleveland Chapter and the

Cleveland Housing Bureau. These comprise not only hotel accommodations but also rooms in private residences, etc. Efforts are being made also to use Pullman cars which bring visitors from out of town as further accommodations convenient to the auditorium.

List of Exhibitors

Firm	Booth	Firm	Booth
Ace Abrasive Laboratories	1908	Brown & Sharpe Mfg. Co.	820
Ace Drill Corporation	226	Buckeye Tools Corp.	804
Acme Tool Company		Buffalo Machinery Co., Inc.	1810
Aeronautical Products, Inc.	1814	Cadillac Gage Company	223
Agerstrand Corporation		Carboloy Company, Inc.	334
Aircraft Machinery Company	1808	The Carborundum Co.	1013
Airon Manufacturing Company		W. R. Carnes Co.	1923
Air Speed Tool Co.	610	Charles Bruning Company	2050
Allegheny Ludlum Steel Corp.	416	Chase Chemical Company	
Allis Chambers Mfg. Co.	1622	Chicago Metal Hose Corp.	1818
Allison Company	1432	Chicago Pneumatic Tool Co.	1505
American Abrasive Metals Company		Chicago Show Printing Company	709
American Chain & Cable Co., Inc.	1418	The Cincinnati Tool Company	429
American Mat Corporation		Circular Tool Co., Inc.	325
American Measuring Instrument Corp.	110	Clinton Machine Company	430
American Society for Metals	432	Clipper Diamond Tool Co.	1806
Ampco Metal, Inc.	201	Colonial Broach Co.	622
B. C. Ames Company	308	Commander Manufacturing Co.	1910
Anchov Coupling Co.	324	Compar Instrument Co.	222
Anderson & Sons	230	Comtor Gage Company	129
Anker-Holth Mfg. Co.	601	Cone-Drive Division	620
R. B. Annis Company	810	Conover-Mast Corp.	305
Armstrong Brothers Tool Co.	211	Arthur A. Crafts Co., Inc.	417
Aro Equipment Corp.	712	Cosa Corporation	1517
Atlas Tool & Designing Co.	1907	Crystal Lake Grinding Company	1907
Bailey Meter Company	2142	Cushman Chuck Co.	1106
Barnes Drill Company	925	Dayton Rogers Mfg. Co.	803
W. O. Barnes Company, Inc.	704	DCMT Sales Corporation	
Barrett-Cravens Company	725	Delco Products Division (GMC)	1102
Patrick Bassett Co.	310	Delta Manufacturing Co.	1014
Bausch & Lomb Optical Co.	104	Denison Engineering Company	1109
Bay State Abrasive Products Co.	2108	A. P. de Sanno & Son, Inc.	802
Beaver Tool & Engineering Corp.	1537	Detroit Power Screwdriver Co.	1804
Behr Products Co.	423	Detroit Tap & Tool Company	618
Bell & Gossett Company	1425	Detroit Universal Duplicator Co.	627
Bell Machine Company	2122	Diamond Machine Tool Co.	1112
Bellows Company	607	Eugene Dietzgen Company	301
Bendix Westinghouse	1444	Detroit Reamer & Tool Company	1843
Black Drill Company	1909	DoAll Company	1401
Edward Blake Company	701	Don Gage Company	2110
Henry P. Boggis & Co.	921	Downing Engineering Company	
Bokum Tool Company, Inc.	120	Dumore Company	708 & 710
Boyd Tool Company	709	Eastern Etching & Mfg. Co.	420
Boyar Schultz Corp.	711	East Shore Machine Products Co.	2120
Bridgeport Machines, Inc.	224	Eclipse Counterbore Company	218 & 220
Briggs Filtration Company	108	Elgin National Watch Company,	
British Industries Sales Corp.	1944	Sapphire Products Div.	314
Bryant Chucking Grinder Co.	122		

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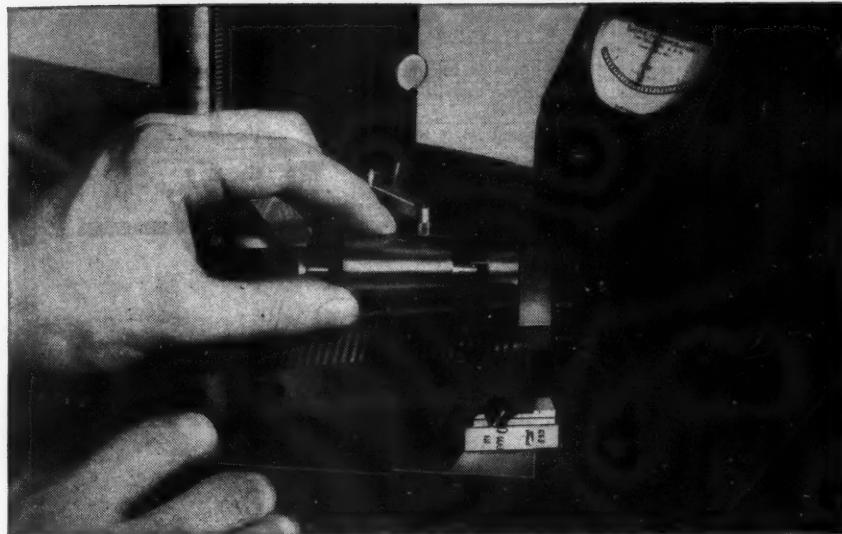
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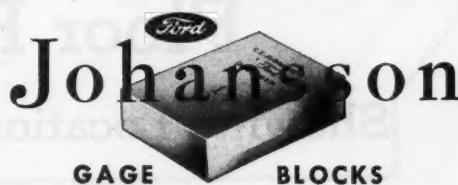


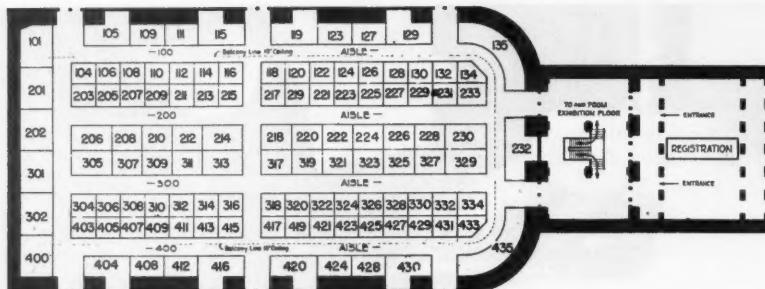
a ten-thousandth is routine . . . where **JO-BLOCKS control by millionths!**

It PAYS to control parts-dimensions to close limits. It pays in ease of assembly, in product performance and in the assured fit of replacement parts. In wartime, it paid richly in human lives saved. JO-BLOCKS, the pioneer precision controls, produced in America by Ford Motor Company only, for all industry, are warranted accurate to .000002", .000004" or .000008"±, and are available in sets at \$23 and upward, or in individual blocks, with various accessories. With properly selected genuine Jo-Block equipment, accuracy control can be maintained to the highest practical degree over any mechanical dimensional inspection.

FREE—NEW CATALOG!

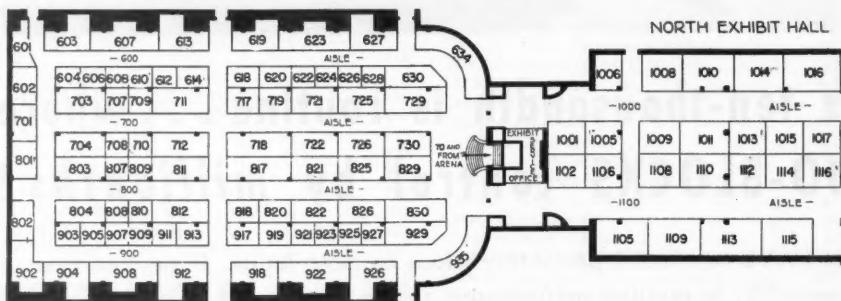
Profusely illustrated, with full details, covering selection, application and care of Jo-Blocks. Write Ford Motor Co., Johansson Division, Dept. 49, Dearborn, Michigan.





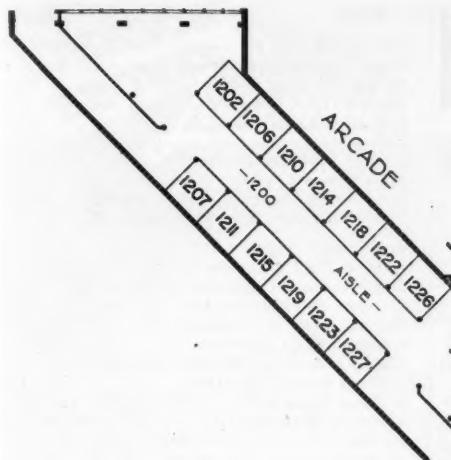
Above is the floor plan of the Arena, which is the main floor of the Auditorium. Visitors enter the Arena directly from the Registration Section.

EXHIBIT HALL



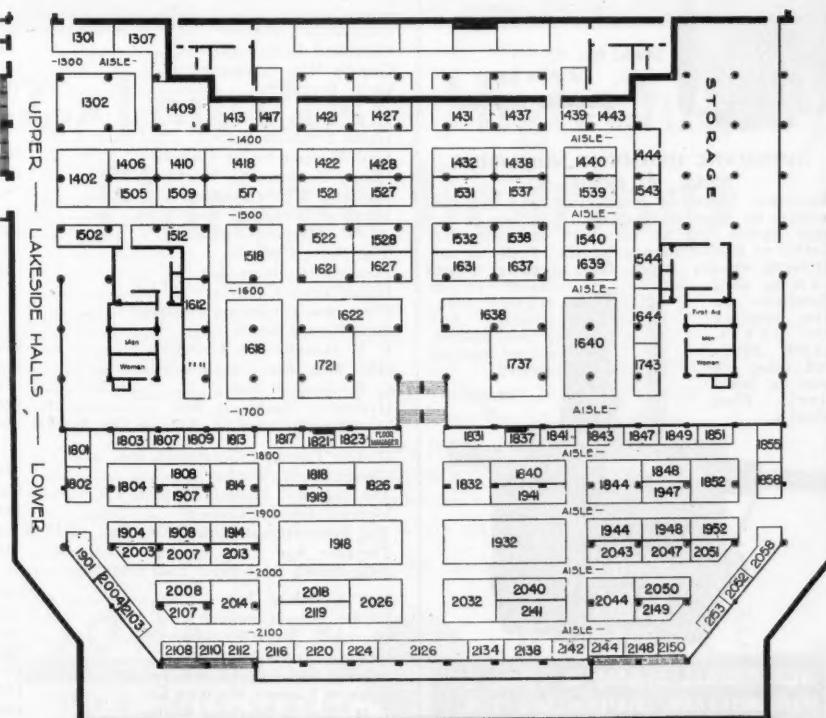
Cleveland Public Auditorium Floor Plans

Showing Locations of Exhibits



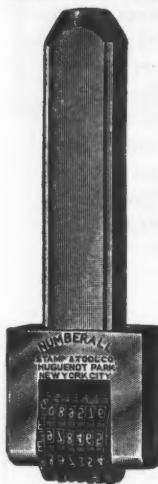
The Arcade extends from the Exhibit Hall to the Upper and Lower Lakeside Halls, both of which are below the street.

Booths numbered from 100 to 500 will be found in the Arena; those numbered from 600 to 1200 are located in the Exhibit Hall; numbers 1200 to 1300 are located in the Arcade, and booths numbered from 1300 to 2200 are located in the Upper and Lower Exhibit Halls.



NUMBERALL

Multi-Wheel Numbering Machine Model 70



The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL Machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Perfectly aligned. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20.

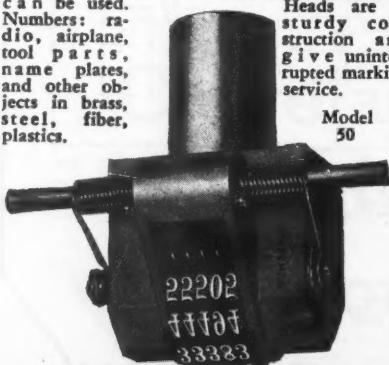
Model No. 70

*Write for
Bulletin MS-70.*

AUTOMATIC INDENTING NUMBERING HEAD • MODEL 50

Automatic indenting numbering head for consecutive or repeat numbering, $1\frac{1}{32}$ " up to $\frac{3}{16}$ " high figures can be furnished in sharp face Gothic or shaded Roman figures. Prefix or suffix letter wheels. Heads are of sturdy construction and give uninterrupted marking service.

Model
50



NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATION ISLAND 12, N. Y.

Firm	Booth
Electro-Lift Inc.	1428
Engis Equipment Company	228
Eutectic Welding Alloys Corp.	1226
Everede Tool Company	911
Ex-Cell-O Corporation	1437
Executone, Inc.	1820
Federal Products Corporation	317 & 319
Fonda Gage Company	405
Ford Motor Company, Johannsen Div.	234
Frick-Gallagher Mfg. Company	101
Gagemakers Supply Co.	109
Gairing Tool Company	825
The Gammons-Hoaglund Company	809
Gardner Publications, Inc.	606
General Electric Company	912
Gerotor May Corporation	1422
Giddings & Lewis Machine Tool Co., Davis Boring Tool Div.	109
Gillman Engineering & Mfg. Corp.	1421
Goddard & Goddard Co.	1206 & 1210
Garfield Engineering Company	
A. R. Gieringer Tool & Mfg. Co.	1110A
Ray W. Goodwin	724
Govro-Nelson Company	
V. L. Graf Company	421
Gray Company, Inc.	628
Gray-Mills Company	1638
Greenleaf Corporation	619
Grenby Mfg. Company	1001
Grob Brothers	1108
E. F. Hager & Son	612
Halco Products Sales	423
Hall Manufacturing Company	1011
Hanna Engineering Works	1502
Hannifin Mfg. Company	703
Hardinge Brothers, Inc.	1914
A. W. Hecker Company	926
The Heim Company	801
Howard H. Heinz, Inc.	222
Heller Bros. Company	419
Hitchcock Publishing Company	219
Holo-Krome Screw Corp.	206
E. F. Houghton & Company	1632
HPL Mfg. Co.	1634
C. B. Hunt & Son	719
Hydraulic Machinery Inc.	1918
Huebner Publications, Tool & Die Journal	404
Illinois Testing Laboratories, Inc.	
Illinois Tool Works	718
The Ingersoll Milling Machine Co.	1621
Ingersoll-Rand Company	1840
The International Nickel Co., Inc.	123 & 127
The Iron Age	232
Independent Pneumatic Tool Company	
Jack & Heintz, Inc.	922
Jacobs Mfg. Company	427
Charles L. Jarvis Company	821
Johnson Gage Company	111
Johnson Gas Appliance Company	1417
Jones & Lamson Machine Co.	1721
J. H. Tool & Machine Works	1809

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Flanged Bearings need not be expensive. Simply eliminate the machining operation by having them produced in Johnson LEDALOYL—Powder Metallurgy. It makes little difference whether the body or the hole is square or round, our method of manufacturing enables us to produce them quickly and economically yet of top quality. The self-lubrication action guarantees long life and smooth, quiet operation. If you use flanged bearings in your product, it will pay you to investigate the possibilities of Johnson LEDALOYL. Excellent delivery can be made on your requirements.

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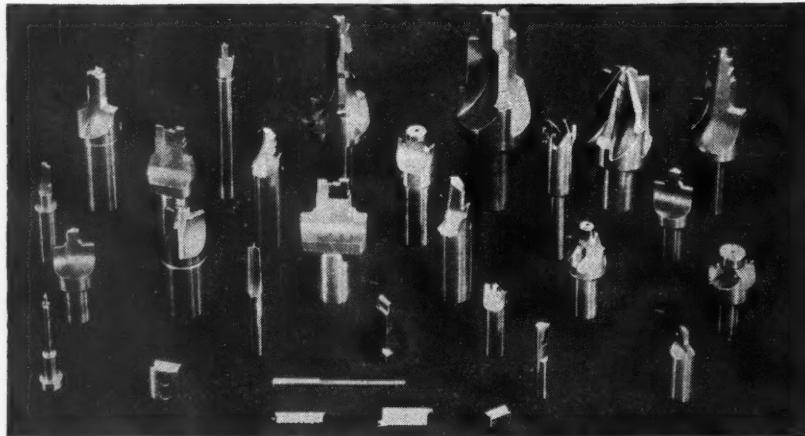
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BRONZE
HEADQUARTERS
NEW CASTLE, PA.

A circular emblem is positioned between the two main company names. It contains the text "THE MOST COMPLETE SLEEVE BEARING SERVICE IN THE WORLD".

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Karge & Son Machine Co.	1803	Michigan Broach Company	407
Kennametal Inc.	822	Michigan Tool Co.	620
Knu-Vise, Inc.	118	Micro Switch Division	205
Koebel Diamond Tool Company	207	Micromatic Hone Corp.	225
Kyle-Johnson Machine Co.	605	Miniature Tool Company	624
Latrobe Electric Steel Company	312	Modernair Corp.	1506
LaVallee & Ide, Inc.	420	Modern Machine Shop	606
Lawson-Leschke Company	1843	Monroe Tool & Mfg. Company	623
H. Leach Machinery Co.	1627	Moore Products Company	904
Lempco Products, Inc.	1509	The Motch & Merryweather Mchy. Co.	1737
Lepel High Frequency Laboratories, Inc.	1414	Motor Tool Mfg. Company	604
Lincoln Engineering Company	608	Mueller Engineering Company	1837
Lipe-Rollway Corp.	817	Munton Mfg. Company	808
John E. Livingston Co.	1841	Nash-Zempel Tools	
The Lloyd Gage & Tool Co.	2138	National Broach & Machine Co.	1223 & 1227
Logansport Machine Co.	1543	Nicholson File Company	322
Lufkin Rule Company	116	Nichols-Morris Corp.	634
Lyon Machine Company	403	Noble & Stanton	112 & 114
McCaskey Register Company	1008	Norton Company	2126
McCroskey Tool Corp.	829	The O. K. Tool Company, Inc.	
McGraw-Hill Publication	1016	Div. of Aerodynamic Research Corp.	321
Machinery	231 & 233	O'Neil-Irwin Mfg. Company	1005
Macklin Company	1637	Owatonna Tool Company	409
Magnafux Corporation	1817	Parker Kalon Company	329
Master Sales Company, Inc.	603	The C. F. Pease Company	1427
Masterform Tool Company	320	Peerless Gauge Company	
F. A. Maxwell Company	927	"Steel"—Penton Publishing Co.	1009
M-B Products	913	Physicists Research Co.	818
Merit Machine Company	923	Pioneer Engineering & Mfg. Co.	316

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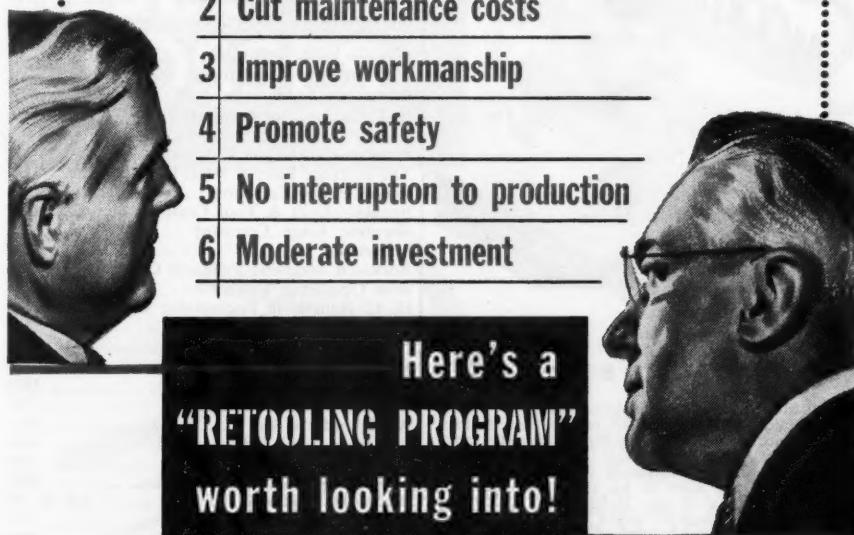
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MEMO: Replace inefficient hand tools right through the plant —

- 1 Cut production costs
- 2 Cut maintenance costs
- 3 Improve workmanship
- 4 Promote safety
- 5 No interruption to production
- 6 Moderate investment

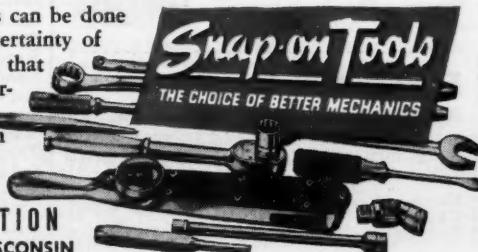
Here's a
"RETOOLING PROGRAM"
worth looking into!



All the hundreds of hand tools used in the average plant may represent less investment than a single machine tool . . . but their over-all effect on costs can total a startling figure! Misfit tools penalize every worker who handles them. *The right tool . . . the fastest, safest, easiest to use tool for each job . . .* saves man hours straight through the plant.

• "Retooling" with modern Snap-ons can be done quickly and economically, with the certainty of securing every cost-cutting advantage that the most advanced hand tool engineering can provide. Through 38 factory branch warehouses in key production centers Snap-on offers direct tool service to industry everywhere.

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Durable! Easily Installed!

Resurface or patch broken concrete floors with tough RUGGEDWEAR resurfacer. Here's a material which will stand up under the most punishing traffic conditions. Simple to install—no chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to irregular edge of old concrete. Provides a firmer, tougher, smoother, more rugged wearing surface. Used indoors or out.

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Pipe Machinery Company	1219
Plymouth Engineering Company	1110
Pollak Manufacturing Company	918
Porter Cable Machine Company	919
Portman Machine Tool Company	903
Pratt & Whitney Company	
Kellerflex Division	1612
Pratt & Whitney	
Niles, Bement Pond Co.	212, 214, 311, 313
Precise Products Company	134
Producto Machine Company	812
Putnam Tool Company	917
Precision Service Corp.	1527
Prisoner of War Display,	
U. S. War Department	
Production Engineering & Management	131
Rack Engineering Company	424 & 428
Racine Tool & Machine Co.	126
Redmer Air Devices Corp.	811
The Reliance Elec. & Engr. Co.	2116
Reeves Pulley Company	1909
Republic Drill & Tool Company	1214
Republic Gage Company	203
Robotools, Inc.	2009
Rockford Magnetic Products Co.	1821
Ross Operating Valve Co.	2134
H. C. Roushkolb Engineering Co.	
Royal Oak Tool & Machine Co.	105
Rustless Steel Company	210
Saginaw Bearing Company	431 & 433
Sales Service Machine Tool Co.	1802
Schauer Machine Company	707
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Sheffield Corporation	826
Sheldon Machine Company, Inc.	1831
Shell Oil Company, Inc.	128 & 130
Simonds Abrasive Company	722
Simonds Saw & Steel Company	1901
Simonds Worden White Company	602
Size Control Company, Div. of	
American Machine & Gage Co.	2103
Skilsaw, Inc.	2124
The Skinner Chuck Company	613
Snyder Tool & Engr. Company	208
Socony-Vacuum Oil Company	1406
Sommer & Adams Company	1826
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Standard Pressed Steel Co.	326
Standard Shop Equipment Co.	229
Staples Tool & Engr. Company	327
Star Machine & Tool Company	408
State Manufacturing & Construction Co.	115
The L. S. Starrett Company	213 & 215
Steel City Testing Laboratory	1918
Steel Products Engineering Co.,	
Combustion Air Div.	1919
Steinle Machine Company	1222
The Stites Tool Company	318

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Cat REJECTION LOSSES

NORTON ABRASIVES



REWORK with OILSTONE Files

Machined parts, rejected at inspection for scratches, burrs, snug radii or sharp edges, represent a critical investment in scarce materials and high production costs. Expensive machine salvage operations or outright scrap loss can be avoided—for these parts can be quickly reworked, free-hand, with oilstone abrasive files.

Whether on revolving work or bench pieces, the hard, sharp abrasive crystals in Oilstone Files, shaped

for conformity to work contours, quickly but delicately remove burrs and sharp edges, refine radii or eliminate binding of mated parts.

India (Aluminum Oxide, oil-filled), and Hard Arkansas (natural abrasive) files offer Industry a complete size and shape range of over a hundred standard stock items with a finish spread from coarse, medium and fine India, to the surgical fineness of Hard Arkansas. Write for descriptive folder, "Oilstone Files."

An ABRASIVE File
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(DIVISION OF NORTON COMPANY)

Also Quality Coated Abrasives Since 1872

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Herman Stone Company	1512	Visi-Trol Corp.	124
Strong Carlisle & Hammond Co.	907 & 909	Wales-Strippe Corp.	1438
D. A. Stuart Oil Co., Ltd.	614	Walker Turner Co., Inc.	1105
Sun Tool & Gage Corp.	1711	Wardwell Mfg. Company	1823
Sunnen Products Company	908	Webster Products Company	1113
Superdraulic Corp.	1918	Wells Mfg. Corp.	626
Sutton Tool Company	411	Weldon Tool Company	221
Swartz Tool Products Co., Inc.	227	Wendt-Sonics Company	721
Super Tool Company	1903	Wetmore Reamer Company	413 & 415
Swedish Gage Company of America	234	Wickman Corp.	106
The Taft Peirce Mfg. Company	323	J. H. Williams & Co.	905
Technical Publishing Co.	107	Willey's Carbide Tool Company	202
G. H. Tennant Company	2150	Wilson Mechanical Instru. Co., Inc.	425
Tinnerman Products, Inc.	304 & 306	Wesson Company	119
Torit Manufacturing Company	1508	N. A. Woodworth Company	1115
Trabon Engineering Corp.	717	Zagar Tool Inc.	1531
Triplex Machine Tool Corp.	1413	Wm. M. Ziegler Tool Company	807
The Tubular Micrometer Company	132		
Tungsten Carbide Tool Company	620		
Turchan Follower Machine Company	1218		
Ultra-Lap Machine Company	1522		
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United Precision Products Company	217		
Universal Engraving & Colorplate Co.	400		
U. S. Navy, Bureau of Ships			
Vapor Blast Mfg. Company	1807		
Vascoloy-Ramet Corp.	730		

Aireon Optical Micrometer, especially designed for measuring the thickness of plastics or glass in hard-to-get-at locations, is fully illustrated and described in a four-page folder prepared by the Aireon Manufacturing Corp., 166 W. Olive Ave., Burbank, Calif. Copy free upon request.

Specify **ROCKFORD** MULTIPLE DISC AND JAW CLUTCHES

COMPACT DESIGN

*Fit snugly into product designs. Specially adapted for transmitting power in machines that handle low tensile materials, and in automatic and semi-automatic machines requiring smooth, multiple-disc, up-to-speed starting — followed by shockless engagement under no-load conditions — to provide positive jaw driving at high speeds.

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POSITIVE NEUTRAL

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EASY ADJUSTMENT



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It shows typical installations of **ROCKFORD CLUTCHES** and **POWER TAKE-OFFS**. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning postwar products.



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THE BIG THREE amount to a policy which we have maintained throughout 16 years of designing and building tools for industry.

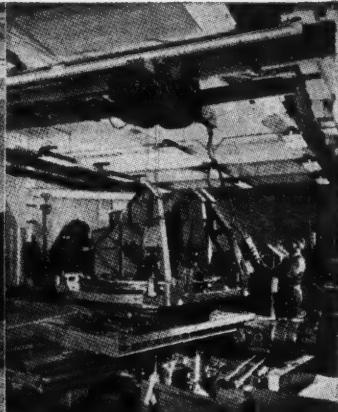
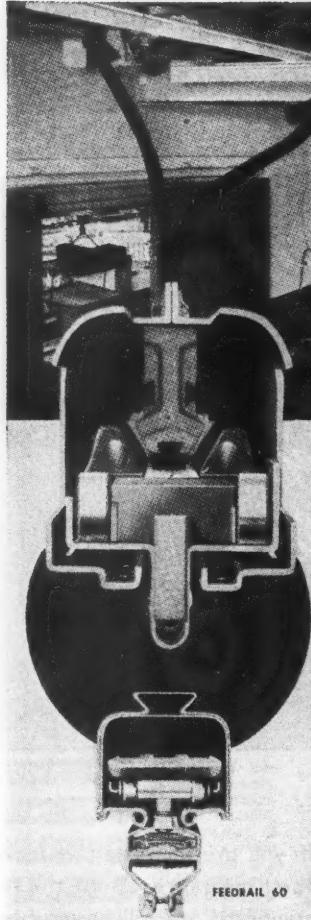
If you are interested in tools that measure up to these standards, we will be glad to receive your inquiry.

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FEEDRAIL on main runways and bridges of cranes.

MODERNIZE YOUR CRANES AND HOISTS WITH FEEDRAIL

Exposed trolley wires have no place in a modern plant. In a day's time, you can substitute the enclosed ELECTRIC FEEDRAIL System.

It requires little space, and is furnished in assembled units in stock lengths and curves. Also available for transfers and switches to fit any desired layout.

Feedrail is mechanically strong, electrically foolproof. Trolleys are completely polarized. All electrical parts enclosed, protected against dust — accidental shorts — mechanical injuries

AND HIGH CYCLE TOOLS

Feedrail is also designed especially for high cycle and portable tools and is used extensively for moving test racks.

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FEEDRAIL**

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FEEDRAIL CORPORATION

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CRITERION *Boring Heads*



Accuracy Accepted

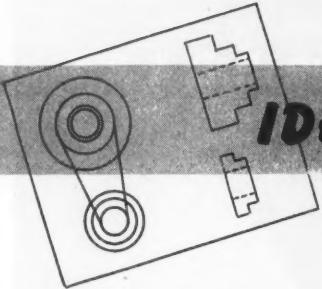
Extremely high accuracy is a standard feature of Criterion Boring Heads. Moreover, original accuracy is maintained far beyond normal expectation. Lead Screw is ground from solid AFTER hardening.

Shanks interchangeable. Criterion Heads are in use throughout the nation.

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CRITERION MACHINE WORKS BEVERLY HILLS, CALIFORNIA



IDEAS FROM READERS

Multiple Tooling On a Planer

By E. R. YARHAM

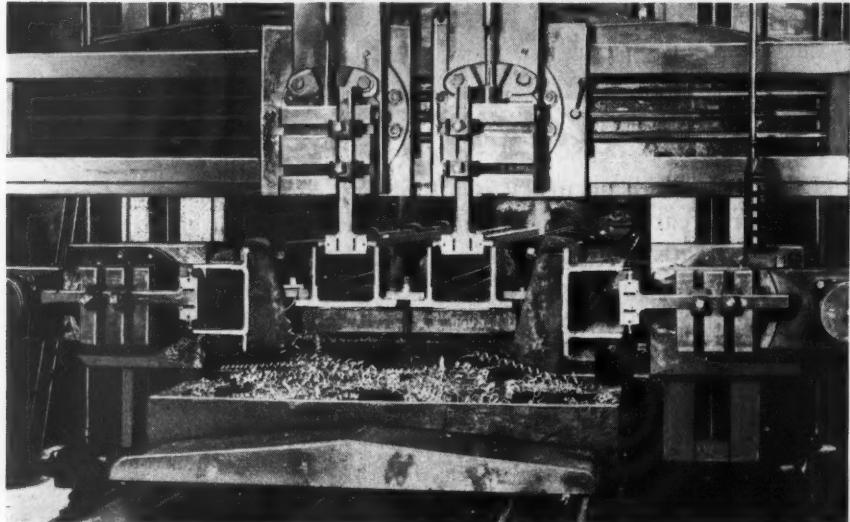
OUTPUT of accelerator tracks for ships of the British Navy was stepped up by no less than 250 per cent in a Scottish factory by the installation of a large high speed planer, and by equipping it with jigs and special tools which enabled the machine to take four sets of tracks at one setting with eight cutting tools

in operation simultaneously.

In the earlier stages of development two tracks were machined at one time with single tools, and, later, double tools were applied to operate simultaneously on each of the two tracks.

The illustration shows a head view of the machine set up for planing four sets of tracks, with the table at the end of its stroke. The eight tools are mounted in four special tool holders, two of which are secured in the vertical tool heads on the cross slide and

High Speed Planer Equipped with Multiple Tool Holders Taking Eight Cuts Simultaneously on Accelerator Tracks in a Scottish Plant



SUTTONS

RUN AS TRUE
AS THE SPINDLE



Style "F"

Full Floating Master Collet with Interchangeable, Replaceable Jaws. For Hot Rolled Stock.

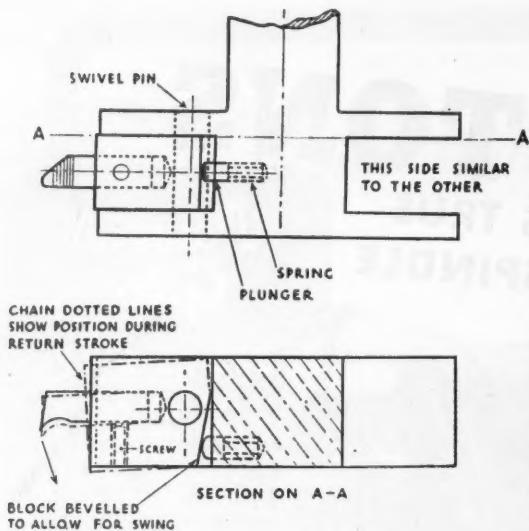
- Each jaw floats independently with full bearing on stock.
- Jaws grip tightly with one-third less tension.
- Jaws made with patented Diamond Grip Serrations.
- Prevents slippage—reduce scrap—reduce strain.
- One master per machine—jaw assortment for full range.
- Jaws quickly, easily changed—saving set up time.

"Only Sutton Collets Are Diamond Serrated"

SUTTON TOOL COMPANY STURGIS, MICHIGAN

SUTTON COLLETS

Drawing Illustrating Design of
Multiple Toolholder for Planer



two in the side heads on the columns. These tool holders are of the "clapper-box" type, as shown by the line drawing.

Each tool is clamped in a swivel block in the main tool holder body, and is automatically relieved on the return stroke of the table, as shown by the chain-dotted lines in the drawing. Spring-loaded plungers return the tools to the cutting position.

The vertical slides have power-operated feed motion, but the side tools are fed by hand; one being fed by the planer operator and the other by his

woman assistant.

The accelerator tracks are about 15 feet long and the faces are machined six inches deep. The depth of cut is comparatively small — approximately $\frac{1}{16}$ inch on a side — and ample power is available. A relatively fine feed is applied.

A further advantage of this set-up is the greater accuracy and improved finish of the completed work.

Lifting Device For Cylindrical Objects

(Courtesy General Electric Co.)

A LIFTING device for moving cylindrical objects to which it is impossible or impractical to attach cables or eyebolts is saving crane operator and crane follower many man-hours at the General Electric Company's Schenectady Works.

As shown in the sketch, the device



Johnson Adjustable Work Clamps

An all-purpose Clamp for lathes, milling machines, drill presses, and many other machines. Saves time and effort. Designed for speedy, accurate set-up and operating ease. Soon pay for their cost.

No. 1— $\frac{3}{8}$ " Bolt. Capacity $\frac{1}{2}$ " to 2" from table or plate.
No. 2— $\frac{5}{8}$ " Bolt. Capacity $\frac{1}{2}$ " to 2" from table or plate.
No. 3— $\frac{3}{4}$ " Bolt. Capacity $\frac{3}{8}$ " to 4 $\frac{1}{2}$ " from table or plate.

Manufactured by W. E. JOHNSON CO., Pequannock, New Jersey

COOLANT PUMPS



BY-PASS VALVES

**KEEP PRODUCTION AT A
STEADY FLOW AND
MACHINED WORK C-O-O-L**

Model AG3M — Fulflo Centrifugal Coolant Pumps do their job with unswerving fidelity . . . coolants are pumped uniformly, steadily where needed.

Designed for economical, efficient operation. Catalog or special models . . . all of the famed Fulflo standard.

Pipe sizes from $\frac{3}{8}$ " to $1\frac{1}{2}$ "; patented seal, splash-proof, ball-bearing motors.



Write for your personal copy of The FULFLO Mechanical Data Book.



For Oil Hydraulic Mechanisms

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OIL-RELIEF VALVES
Flange or standard types**

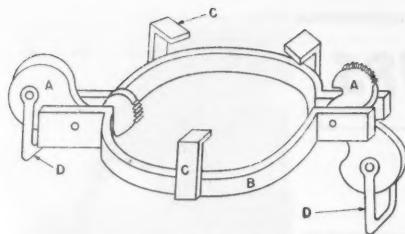


THE



Specialties Co., Inc.

BLANCHESTER, OHIO



Device Developed in General Electric Plant for Lifting Cylindrical Work

has two pivoting jaws **A** opposite each other on a ring **B**. The jaws function in the manner of a pair of ice tongs in that they make the weight of the object being lifted exert the force to hold it securely.

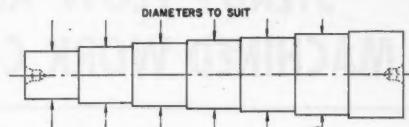
Three inverted L-shaped pieces **C** spaced around the outside diameter of the band position the device when it is lowered over the object to be lifted. Then a crane is attached to the clevises **D** on the two jaws, and the subsequent

lifting movement pivots the two jaws down and inward so that they hold the positioned object firmly.

Multi-Mandrel

By RONALD EYRICH

WE ARE frequently called upon to machine gear blanks in one of six sizes that have come to be regarded as standard for this job. To turn the blanks, we originally mounted them on a mandrel in the usual manner for turning in the lathe. Finding that the job could be counted upon with regularity, however, we decided to make a



Mandrel Designed to Take Six Different Diameters

a mandrel that would accommodate all of the bores in the six sizes of blanks and thus eliminate the necessity for keeping six mandrels available for this job.

Accordingly, we made the step mandrel shown in the illustration. The saving in material, storage space, and handling time when one mandrel takes the place of six is readily apparent.

The MEEKER Timken Roller Bearing Live Center

The original live center with replaceable point. With the Greater Accuracy and Load Carrying Capacity of Timken Tapered Roller Bearings.



The bearings are provided with adjustment for pre-load and take-up for wear should any occur.

Removable points may be replaced with new points, or points of special design. Seat for point ground after assembly, assuring true running interchangeable points.

Meeker Manufacturing Co.

894 EAST 149TH STREET

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DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
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EVERY FIXTURE THE OPERATOR WANTS



B640 HIGH SPEED GRINDING ATTACHMENT B643 MOTOR DRIVEN WORK HEAD



B685 RADIAL GRINDING FIXTURE B642 LARGE SENSITIVE WORK HEAD



B647 TAP GRINDING FIXTURE A642 SMALL SENSITIVE WORK HEAD

"Knock-Out"
UNIVERSAL
TOOL GRINDERS
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TOOL GRINDERS



Knock-Out Engineers have made available more time-tested grinder fixtures than has any other manufacturer. If it can be done—it can be done more easily and economically on a K-O Grinder.



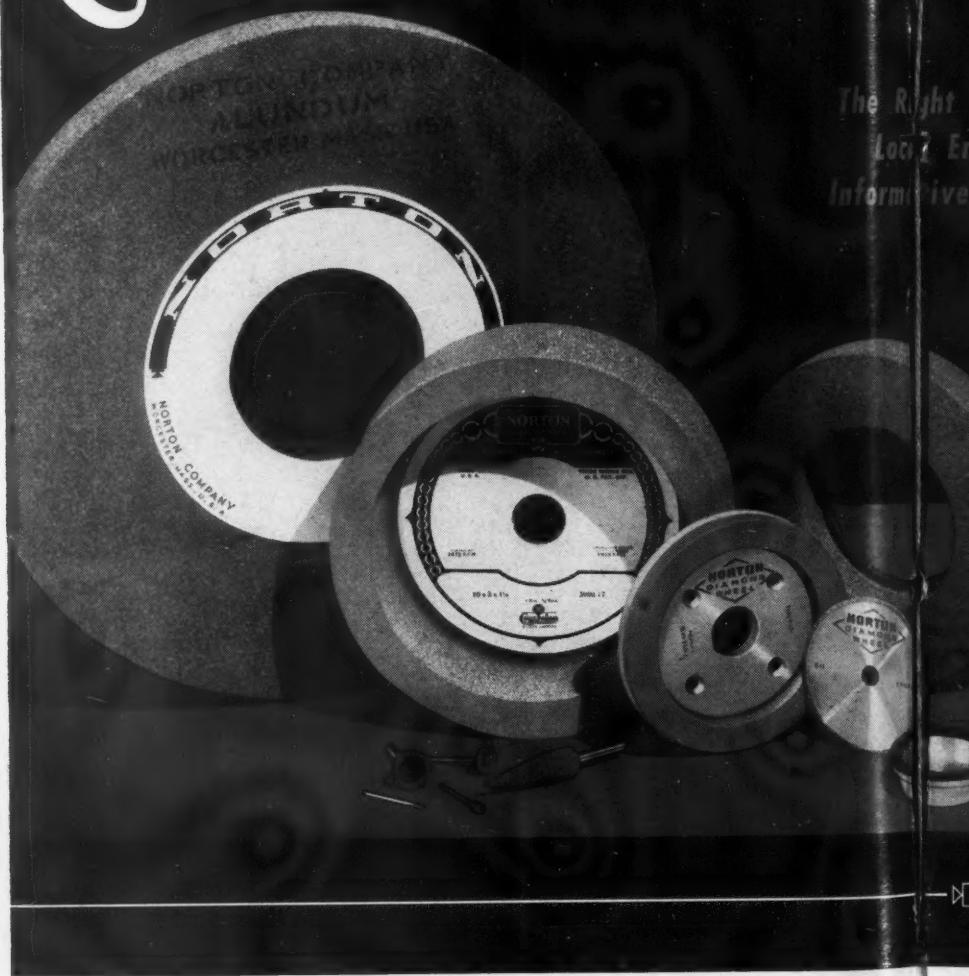
Model B600 Single
Speed Universal Tool
Grinder.

Write Knock-Out at Aberdeen
for booklet No. 34-46.

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For the Tool Room

The Right Wheel for Each Job
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NORTON ABRASIVES

For High Speed Steel Tools

Alundum, 38 Alundum and 57 Alundum "B-E" bond grinding wheels for sharpening tools and cutters of high speed steels and alloys of the Stellite type.

Open Structure grinding wheels for the jobs that require extra heavy stock removal or extra coolness of cut or both.

Fine grit grinding wheels for producing the high surface finish that greatly lengthens cutting tool life.

For Carbide Tipped Tools

Vitrified bonded diamond wheels for the off-hand grinding of single point cemented carbide tools.

Resinoid bonded diamond wheels for sharpening multiblade carbide tools such as milling cutters and the like.

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Fluting a Spiral Tapered Reamer

By CLYDE L. FANNING

WHEN a helical groove is cut on cylindrical work on a universal milling machine, the angle at which the table is set is calculated by the formula:

$$\tan a = \frac{C}{L}$$

C = circumference

L = lead of the helix

When the work is tapered, however, the helix becomes a spiral and since the diameter of the work is a factor in calculating the angle of the spiral, the angle varies throughout the length of the work.

In practice, spiral flutes are often cut on tapered work by setting the table at an angle suitable for the center of the work with the result that the

tooth shape at both ends is affected—the greater the taper in the work, the greater the error in tooth shape.

The following procedure will be found to be advisable, especially on the steeper tapers.

1. The work is set between the dividing head centers as would be done for milling a tapered reamer with straight flutes.

2. The angle at which the table should be set for the small end of the reamer and the angle for the large end are computed. Using the length of the taper, the number of thousandths the table moves for each half degree of difference in table angle along the spiral is computed.

3. The table is set at the angle for the small end of the taper and the cut started without clamping the table at the angle. As the table advances the calculated number of thousandths the operator bumps the end of the table with the heel of his hand to change the

grinds straight and spiral flutes from solid —automatically

Automatically grinds straight and spiral flutes in tool stock such as taper pin reamers, small taps, teeth in milling cutters, angular cutters, sharpens saws in gangs up to $3\frac{3}{4}$ " long with diameters ranging from $\frac{1}{2}$ " to 8".

It is especially effective in grinding and sharpening reamers in a wide range of sizes down to $1/16$ " diameter with spacings from 2 to as many flutes as tool requires.

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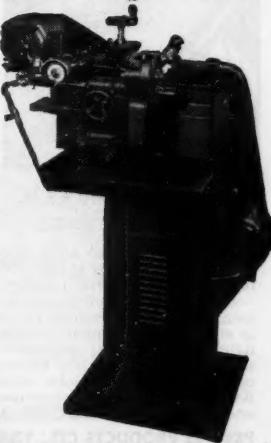


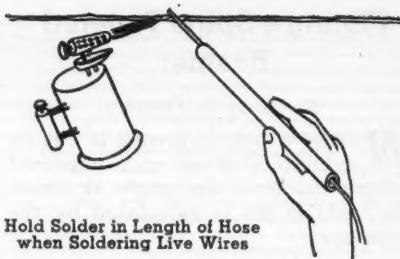
table one half degree, repeating the process until the cut is taken through the flute.

The finish in the flute will not be materially affected by this method because the table pivots directly under the cutter and the double angle of the cutter allows some variation in table angle without interference with the sides of the flute.

Safety in Soldering Live Wires

By A. H. WAYCHOFF

SEVERAL times I have found it necessary to solder connections on live wires, in the course of which I had to touch the wire with the solder. Unless proper precautions are taken, this practice can result in injury or even death. However, the job was completed with no casualties, because I



Hold Solder in Length of Hose when Soldering Live Wires

had previously equipped myself with a section of air hose of the common variety, which I used to hold the solder as shown in the illustration.

By running the solder through the hose, as shown, the solder may be held in the hand and laid on the connection in the usual manner without danger from the current. In case the piece of hose isn't available, a short length of dry wood with a small hole drilled in it lengthwise can be made to serve the purpose, but not as easily or efficiently.



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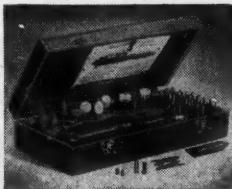
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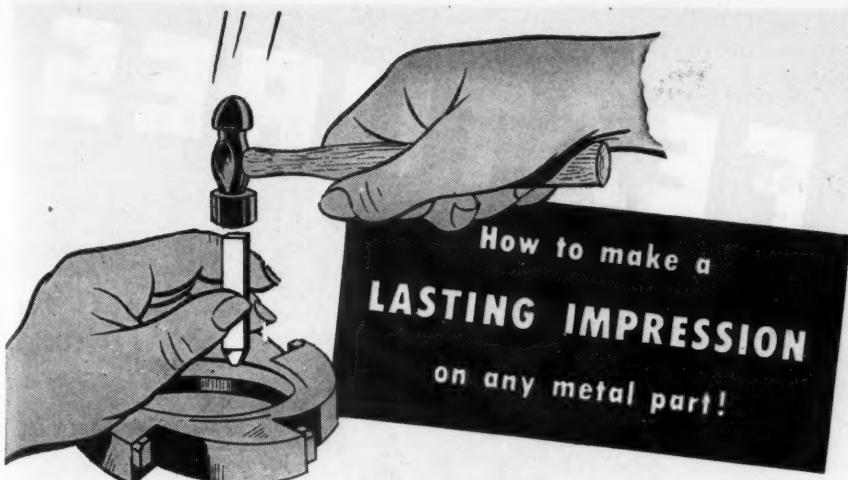
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News of the Industry

AMA Personnel Conference Considers Industrial Relations

Union labor agreements and ways and means to reconcile the broad spread of differences of opinions and concept of labor relations occupied the undivided attention of the mid-winter Personnel Conference of the American Management Association at the Palmer House in Chicago, Feb. 13 through 15, attracting a record registration of 2,200 members who came prepared to get the facts on labor relations as they exist today.

Pointedly, Ralph A. Lind, labor relations consultant, Stevenson, Jordan & Harrison, Inc., New York, predicted that labor, now accepting 15% to 18% wage settlements, will demand the balance of the original 30% increase when current contracts expire next year.

Frank Rising, general manager, Auto-motive & Aviation Parts Manufacturers, Inc., predicted devastating membership raids on each other by the CIO and AFL unions, with the employer caught helplessly in the middle. Dr. E. Wight Bakke, director, Labor and Management Center, Yale University, warned industry and labor they will both be destroyed if they do not cease their bitter struggle for all-out power.

Clarence Randall, vice-president, Inland Steel Co., Chicago, flatly declared there is no easy answer to the present labor-industry controversy and that none would be forthcoming "until we have employers who can say no, and a president who will let them."

Richard A. Fear, director, Industrial Division, Psychological Corp., New York, urged greater attention to employee selection as a means to achieve higher production through better equipped employee material as a means of saving time and reduction in labor turnover. He suggested a selection program embracing such problems as seniority, security, job specifications, application blank preparation, technique of the preliminary interview, aptitude tests, reference check-up procedure, and the details of the final interview.

Dr. Joseph Tiffin, Division of Applied Psychology, Purdue University, advocate-

ed more attention to merit training of employees, based on these suggestions: (1) Promotion. Identification of men who are eligible for promotion either for a high rated or supervisory job. (2) Transfer. Identification of men who have the necessary skills, abilities, and/or adaptability to fill a vacancy or another job or in another department. (3) Employee improvement. Analysis of strong and weak points of an employee so that both management and employee can properly direct their efforts toward the development of personal characteristics, skills, or information that will make the employee a better employee and increase his chances of continued upgrading. (4) Identifying groups of better or poorer employees for the purpose of testing or trying out personnel tests. (5) Identify men for layoff when production is curtailed. Although union contracts often contain a clause which provides that seniority shall govern only when "ability, skill and job performance" are equal, it is a matter of common knowledge that unions have been very reluctant, to put it mildly, in accepting merit ratings as a satisfactory measure of "ability and skills."

George B. Corless, Employee Relations Department, Standard Oil Co. (N. J.), New York, announced that his company is inaugurating an executive development plan to develop reserves of executives comparable to its reserves of physical assets. He said that Standard Oil management considers its personnel its greatest asset, and the development of competent executives with broad business experience of the same importance as its investment program. This program is based on a long standing policy of "promotion from within."

A top management committee will be established in each of the parent company's affiliates, whose functions will be to determine the job requirements of each key position, inventory the personnel, prepare organization replacement plans, and create "assistant to" positions especially for on-the-job training. A year's experience as an assistant in both the Employee Relations Department and the Maintenance Department are

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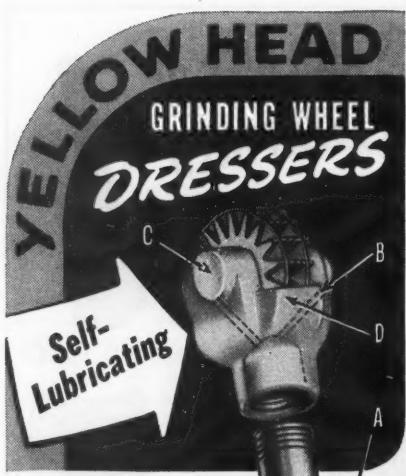
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Dry, greaseless graphite is sucked from the large magazine in a thin film, providing constant lubrication for all moving parts. As shown above: A—Magazine for dry graphite, B—Ducts to bearings, C—Spindle bearings; D—Safety hood. Sturdily constructed, economical to operate.

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prerequisites for advancement to management in one plant. The program is long-range in set-up and concrete results will be several years in the making.

Dale Yoder, director, Industrial Relations Center, University of Minnesota, described the use of personnel statistics as necessary to help industry from having ignorance foisted on it and the concerns and agencies it represents. He declared that outside statistics, generally available from government and private agencies, should scarcely be regarded as indicating ideals in performance, warning they are only averages, and, with present levels of personnel practice, they set a critical score before which any record without extenuating circumstances may be suggestive of actual malpractice.

Raymond S. Livingstone, vice-president in charge of personnel, Thompson Products, Inc., Cleveland, O., made the statement that 80% of the workers of the country are not members of unions, and that these workers are presently held in scorn by the U. S. Government. He said the history of American industry has been one of constantly-rising wage levels, shortened working hours and declining prices, plus increased quality of products, achieved through individual bargaining and the recognition of merit in the plant—all of which is the reverse of what is being done today.

He pointed out that the American workman was—and still is—an individualist; not a collectivist. The workman is an optimist, has pride of home, family, job, company. He wants and deserves to be respected. He wants fair play. He is intelligent; has latent ability. But he is short on knowledge of business and industry. He wants security, and after that is attained, he wants to progress.

But why is he told today that he has no future and is just a slave of industry—cheated, robbed by rich owners; just a number? Livingstone charged that the CIO is aided by the government and that the AFL regards itself as having a franchise to "run" the trades in which it is interested. He suggested that management show more interest in the personal welfare of the worker and that the owner or top management representative—the "Old Man"—mingle more frequently with his men and make periodical trips through the plants and talk with the men on a personal man-to-man basis. He said no company need fear union domination in their plants if they have intelligent management.

Eugene J. Lyons, director, Industrial Relations, Merck & Co., Inc., Rahway,

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N. J., suggested the use of more company publicity to both the employees and the general public about their activities, policies, etc. He warned that industry as a whole has paid a terrific price for adherence to the old adage, "Silence is golden," particularly as it regards employee relations.

He pointed out that the growth of unions has destroyed the illusion that wage rates and other working conditions could be kept secret. Unions are making public every gain in wages and every change in employment conditions, sometimes inaccurately, hence forcing the employers to act in self-defense. He urged employers to report immediately to the press any work stoppages or strikes. The first newspaper story of such a development usually is the major one and is the one that sticks in the public mind.

The panel on Areas for Labor and Management Cooperation, under the chairmanship of George Hodges, manager, Labor Relations, International Harvester Co., Chicago, brought out the thought that the source of most grievances lie in the administration of technical operation, based mainly on lack of understanding of company policy by supervisory personnel, and the fact that too often

labor union representatives gloss over actual controversial differences and tear to pieces any suggested remedies.

Management representatives on the panel took the viewpoint that a labor policy in one plant need not necessarily be foisted on another plant in the same company, or in the plants of other companies, as contrasted to the labor viewpoint that plant policies, particularly in CIO plants, should be identical throughout all comparable plants in the country.

"Quickie" work stoppages came in for some extended discussion with the conclusion reached that this condition would be eliminated after the current labor unrest clears up, provided the men produce more, which, the union representatives declared, must be based on something akin to the guaranteed annual wage. It was conceded by both sides that management must educate key men to handle labor problems, and that there must be developed a common understanding among both management and labor on all production problems and policies.

It was agreed that the number of steps in the settling of plant grievances must be reduced so that settlements can be reached more quickly and not be permitted to draw out and create a continuance and jelling of complaints.

A black and white photograph of a Brown & Sharpe Universal Grinder. The machine is mounted on a base and features a motor drive unit on the left. Labels point to various parts: 'SPEED INDICATOR' at the top, 'HAND WHEEL' on the side of the motor, 'BELT GUARDS' on the right, 'BELT TENSION KNOB TO CHANGE BELT FROM DEAD CENTER TO CHUCK WORK' on the left, and a label for the grinder itself on the right. The background shows the rest of the grinder's structure, including the worktable and a small wheel.

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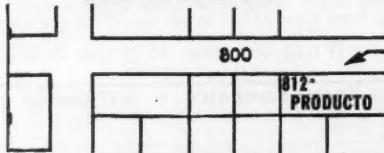
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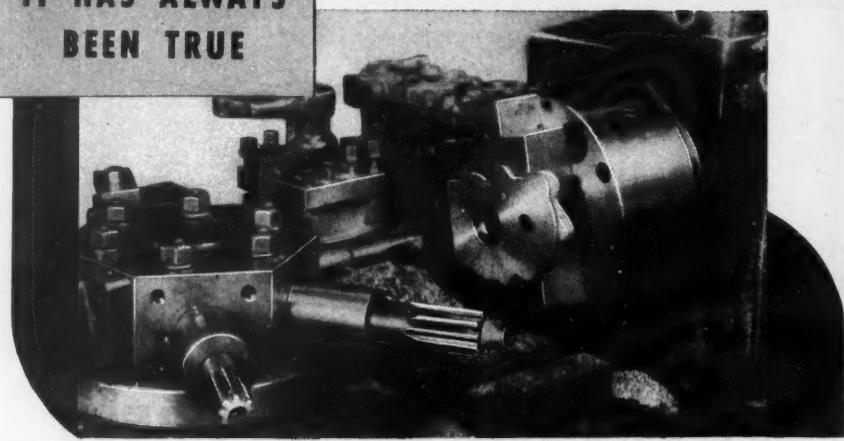
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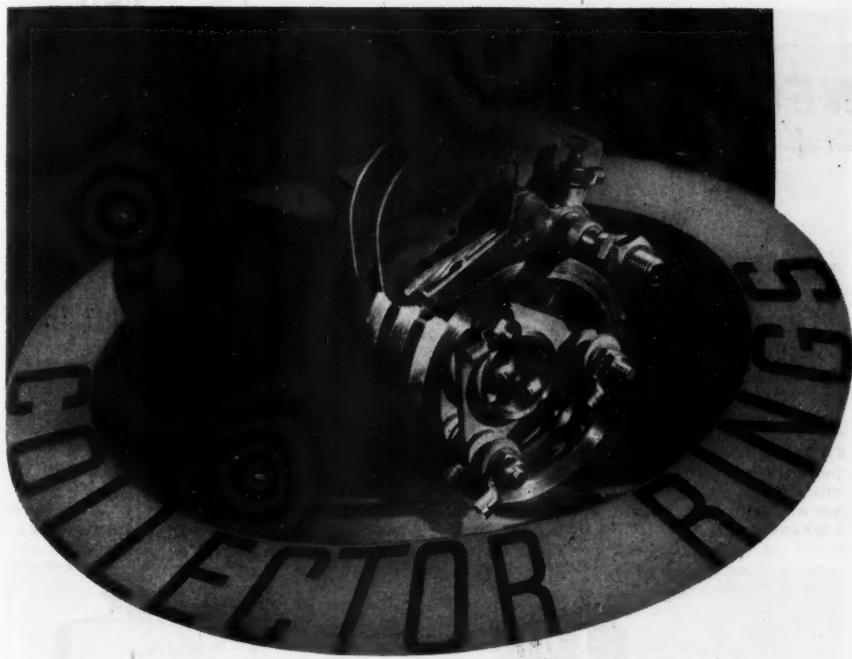
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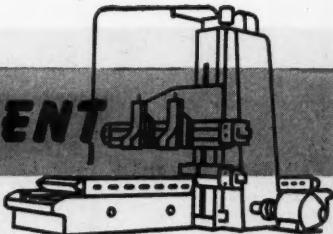
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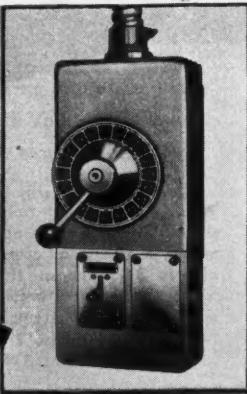
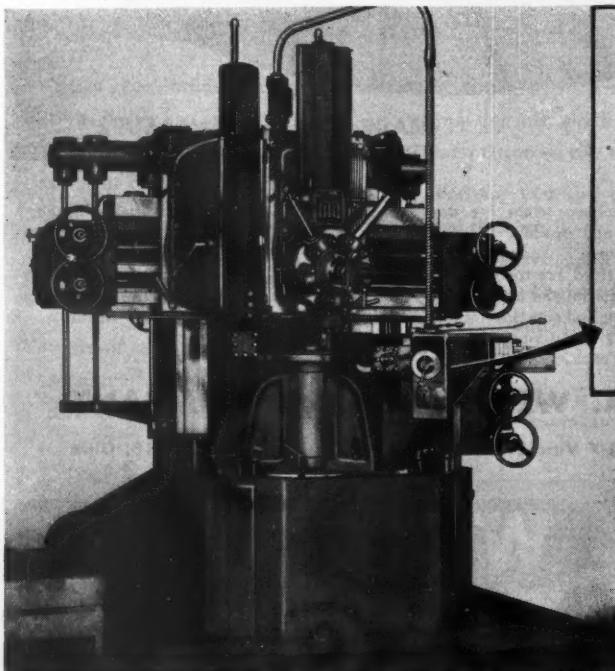


Pendant Control for Bullard "Cut Master" Vertical Turret Lathe

Designed to provide a high degree of control and operating efficiency, a pendant control for all Bullard "Cut-Master" Vertical Turret Lathes is announced by The Bullard Co., Bridgeport 2, Conn. A swinging arm carrying the pendant is mounted on top of the machine high enough to permit full clearance of the vertical heads when in their highest positions. The pendant is locat-

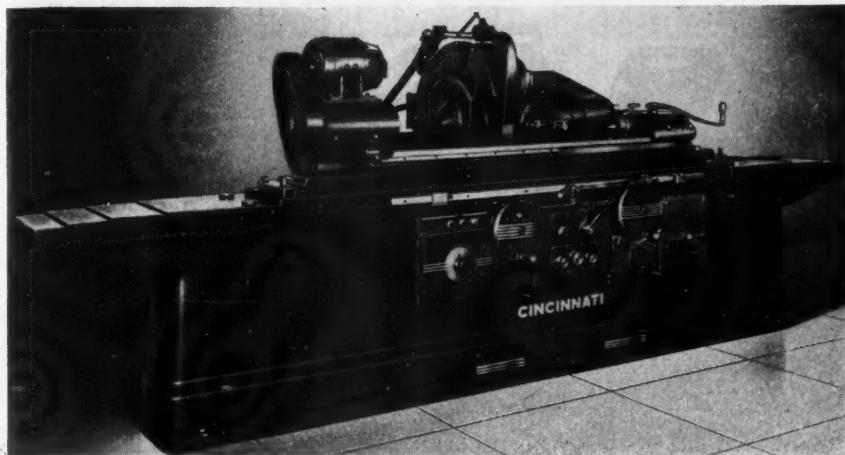
ed at a convenient operating height, and the arm may be swung from the right side of the machine to any convenient point on the left side of the machine, thereby affording full operating control at all times.

Speeds are rapidly selected by means of dialing. When the machine is in operation and a speed change is desired, the switch lever is thrown into brake position, the change of speed quickly dialed, and the lever thrown back into clutch position. Gears are said to be quietly and practically instantaneously



shifted through electrically controlled hydraulically-operated mechanisms. A

Bullard "Cut Master" Vertical Turret Lathe Equipped with Pendant Control



Cincinnati 14-Inch-L Plain Hydraulic Grinding Machine

self-interlocking design provides protection for the proper selection of gears.

Jogging of the table for positioning and indicating purposes can, it is claimed, be very easily accomplished through the use of the switch lever of the pendant control, the lever allowing for jogging and positioning of the table for any fraction of a revolution.

Cincinnati Plain Hydraulic Grinding Machines

A line of four precision center-type plain hydraulic grinding machines designated as 6-inch, 10-inch-L, 10-inch, and 14-inch-L respectively is announced by Cincinnati Grinders, Inc., Cincinnati 9,

Ohio. The two sizes followed by letter "L" are light types, having all the characteristics and built in the same lengths as the sizes immediately preceding them, but having the extra swing capacity to accommodate a flange or projecting arm on the work.

The same features are incorporated in all four sizes. Grinding wheel spindles run on Filmatic bearings, a unique construction used in all Cincinnati grinding machines. A Filmatic bearing at each end of the spindle and a bronze thrust bearing built around a shoulder mid-way between the ends of the spindle completes its mounting. These Filmatic bearings consist of five segments, or shoes, equally spaced around the superfinished spindle bearing diameter and located by pins and adjusting screws so

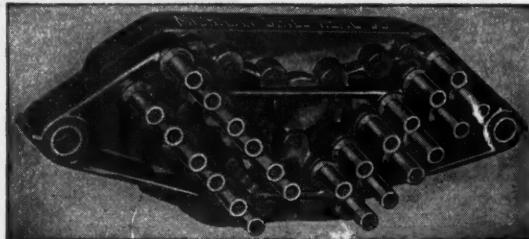
Pictured: a 24-Spindle Heavy Duty Drill Head.

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Cincinnati 6x30-Inch
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maintain exact dead-center rotation, it is claimed.

Tables are traversed hydraulically by means of an externally mounted motor-driven pump unit which obtains hydraulic oil from a reservoir cast in the machine bed. The cylinder, the inside diameter

of which is machine honed to eliminate tool marks and scratches, is attached to the underside of the table. One end is fixed while the other end is free to expand longitudinally. A unique piston and piston rod arrangement allows for expansion of the rods also. There are two pistons, each connected

that they can pivot. Filtered oil under a light pressure is circulated to the bearing compartment. As the spindle rotates it draws oil under the segments. They pivot a slight amount, creating a high-pressure wedge-shaped oil film between each segment and the spindle. These self-renewing high-pressure oil wedges

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YOU REMOVE HARD SCALE, BURNT SAND AND OTHER HINDRANCES TO RAPID MACHINING WHICH ALSO TAKES THE EDGE OFF CUTTING TOOLS ALL TOO QUICKLY

Sand Blasting

is purely a labor-saving process which merits close consideration from manufacturers in all materials — metals, plastic, bakelite, glass, etc.

MAT and SATIN FINISHES

from fine silky effect to coarse, frosty effect.

Scale, Rust and Corrosion cleaned away rapidly.



Leiman Bros. Cabinet Sand Blasts

with continuous sand feed will outproduce wire wheel scratch brushing and acid dips, giving uniform results without spots or blemishes AND QUICKLY.

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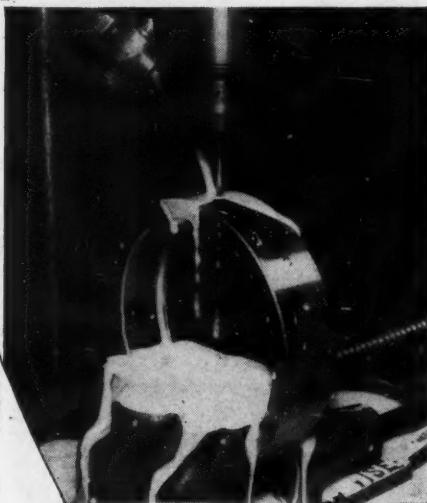
with Coolant

DRILL HARDENED STEELS faster and better!

MEMO: from T.G. Geffert, Pres.

At the Metal Show in Cleveland, I had the chance to discuss the performance of "Hardsteel" drills with many of our customers. In nearly every case, those who were not getting good results were using the drill dry. The aim of this message is to urge the use of a coolant for drilling hardened steels with "Hardsteel".

T.G.
J.G.



"HARDSTEEL" Drills, Tool Bits and Special Tools are solving many production problems. Write for your free copy of the "HARDSTEEL" Operator's Manual. Also inquire about "HARDSTEEL" as a metal for special parts that must meet unusual conditions of service.

To get best results from your "HARDSTEEL" drills use a coolant wherever possible. Advantages are

Faster drilling
Clean hole with no extrusions
Less skill needed
No tempering or cracking of work piece

No discoloration
Longer life between grinds
Greatly reduced chance of breakage
More, better work from each drill

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for Better Belt Joints

To keep belts in service longer, use only GENUINE Clipper Belt Hooks applied with Clipper Belt Lacers.

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Clipper Hooks are made of the finest quality wire—**BETTER** than ever before—produced for our exclusive use. Hooks hold with firm, sure grip — give longer satisfactory service.

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No. 9
Portable Lacer

The Clipper No. 9 Portable Lacer laces belts up to 6 inches wide in one quick, easy operation. Under powerful pressure hook legs are embedded flush with the surface of the belt and points clinched, making a perfect joint.

Phone your mill supply jobber for a demonstration!

CLIPPER BELT LACER COMPANY, Grand Rapids 2, Michigan, U.S.A.



to a lapped piston rod extending from the piston through the end of the cylinder. A small space between the two pistons allows the rods to expand longitudinally thereby exerting no effect whatever upon the accuracy of table traverse. Bleeder tubing and a choke coil to automatically dispose of entrapped air and sea-ring packing to prevent leakage of oil, complete the hydraulic table traverse equipment.

Table traverse rates may be infinitely varied from 3 inches per minute (for truing) to more than 200 inches per minute through a knob control. A single lever control starts and stops the table traverse and coolant flow. If desired, the coolant may be relegated to hand control by means of a push-pull knob. Length of table traverse may be automatically dog controlled from the full rated stroke to as short as $\frac{1}{2}$ inch. Tarry at each end of the table stroke may be independently adjusted, from 0 to 5 seconds, by means of knob controlled throttle valves. The handwheel at the left operates a Servo control which moves the table at the rate of 1 inch per revolution.

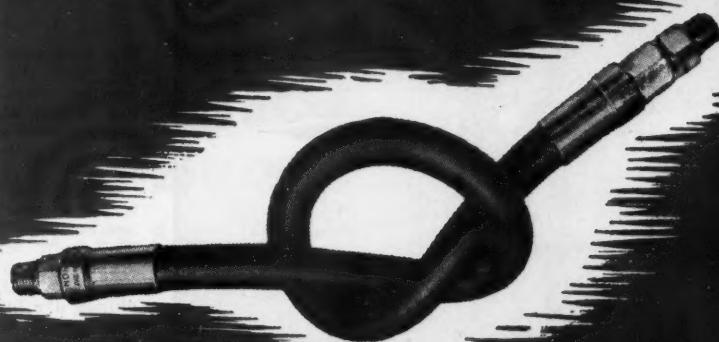
Infeed or cross traverse for the wheel head is controlled from the front of the machine bed by means of the large handwheel at the right. It features a large graduated dial which serves as a convenience in setting up the machine. Automatic pick feed at table reversal may be set for one to seven notches on the pick feed wheel; equivalent to 0.0004 to 0.0028-inch diameter reduction.

Hand adjustment for sizing reduces the work diameter 0.0001 inch when the handwheel is moved one increment of spacing. The cross traverse mechanism for 6-inch and 10-inch-L machines is arranged for rapid hand traverse of the wheel head. It consists of a single tooth clutch operated by the lever which is partly hidden behind the handwheel. With this clutch engaged, one turn of the handwheel moves the wheel head 0.125 inch, more than twice as fast as normal operation.

Footstocks are combination handwheel and lever retraction type. The center end of the spindle carries a truing bracket.

The design of the headstock unit depends upon the size of the machine. Headstocks for 6-inch and 10-inch-L machines are powered by a $\frac{1}{4}$ h.p. a.c. motor. Four spindle speeds are available, selected by means of a V-belt riding on four-step pulleys. Speeds range from slightly less than 100 r.p.m. to nearly 400 r.p.m., depending upon the electrical

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Norgren Industrial Hose Assemblies

Norgren Industrial Hose Assemblies defy failure under the toughest kind of service—deliver dependable power for any hydraulic or pneumatically operated machinery.

Built of tough, wear-proof synthetic rubber hose. Resistant to vibration, heat, cold, grease and solvent. Reinforced with woven high-tensile steel wire. Flex almost indefinitely without failure—won't kink on sharp bends—stay put under extreme vibration.

Couplings of machined brass bar stock—permanent couplings for high pressures—reusable couplings for low pressures. Available: $\frac{1}{4}$ " to 1" I.D., any length.

Write for catalog 400. C. A.
Norgren Co., 220 Santa Fe
Drive, Denver 9, Colorado.

Norgren



Sheffield Template Grinder with Electronic Control

h.p. hydraulic motor; for the two smaller sizes, $7\frac{1}{2}$ h.p. wheel spindle drive motor and 1 h.p. hydraulic motor.

Six-inch and 10-inch - L machines are built in 18 and 30 - inch lengths while 10-inch and 14 - inch - L machines are built in 18, 36, 48, 72 and 96-inch lengths.

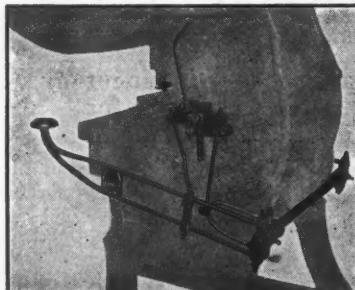
characteristics. Headstocks for 10-inch and 14-inch-L machines are powered by a 1 h.p. d.c. or variable voltage a.c. motor. Spindle speeds are changed by means of a built-in rheostat at the front of the machine. Speed ratios are approximately 4 to 1 for d.c. equipment, and 12 to 1 for the variable voltage equipment.

Table and cross ways are automatically lubricated by means of a pressure system which supplies filtered oil at about 5 pounds pressure. Grinding wheel spindle bearings are also automatically lubricated with filtered oil and protected by pressure switch in electrical circuit.

Power ratings for the larger sizes are 15 h.p. wheel spindle drive motor and $1\frac{1}{2}$

Sheffield Template Grinder with Electronic Control

A template grinder with electronic control of wheel head axial traverse for the precise grinding of templates and other work up to 72 inches in length, 8 inches in depth, and 1 inch thick without repositioning is announced by The Sheffield Corp., Dayton 1, Ohio. The machine was originally designed for the specific purpose of grinding templates used in laying out and checking automobile body dies and the parts produced with such dies. These templates are approximately $\frac{1}{8}$ inch thick, and as many as eight can be ground at one time. Templates for many other types of profiles, including



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Combination Gate and Barrier Guards
Two-Hand Safety Starting Devices
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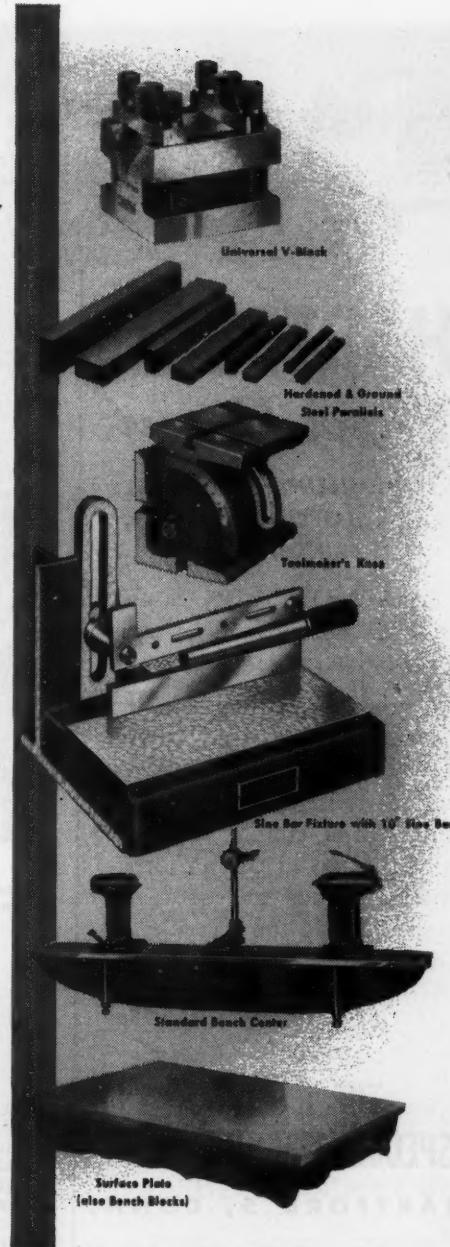
JOHN HUMM SAFETY EQUIPMENT CO.
251 SHEFFIELD AVE. BROOKLYN, N. Y.

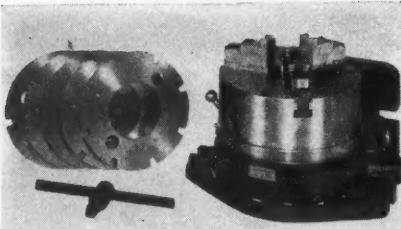
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These tools are standardized specialties, many of them originally developed in the world's most famous toolroom — products of the inventiveness of Taft-Peirce master toolmakers. Beginning with the founding of our Small Tool & Gage Division in 1914, this line has grown steadily as new ideas have proved their worth in our own shops, and includes many items obtainable nowhere else. Now, as then, T-P is the *Top Producer* of set-up and inspection tools.

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THE
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"Super-Spacer"

**FOR MILLING, DRILLING,
SLOTTING, BORING,
GRINDING**

The HARTFORD "Super-Spacer" has proved its wide possibilities to many users.

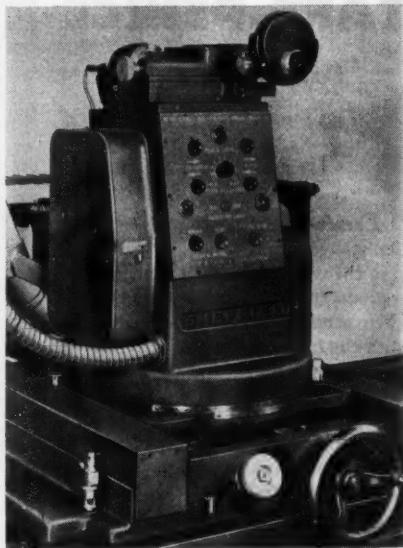
Assures accurate machining operations and rigid control on your milling, drilling, grinding, slotting and jig boring. It is simple, compact and rugged in design, operates at speeds and feeds limited only by the capacity of the machine.

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DATA**

**THE HARTFORD
SPECIAL MACHINERY CO.
HARTFORD 5, CONN.**

those encountered in aircraft fuselage and wing manufacture, can be economically made due to the speed with which the grinding operation may be performed.

The Sheffield Template Grinder consists primarily of a base upon which a wheelhead with control panel and optical equipment traverses; the electronic control unit, and a work table with adjustable parallel work supports. The work, with the desired profile scribed on it by either a scribe or by a photographic



Close-up view of Sheffield Template Grinder showing the convenient arrangement of operating controls

process, or with a master template mounted on top is clamped on the work table. The supporting parallels are adjusted to the rough outline of the work. The wheelhead is positioned on the transverse ways by the electronic controls so as to bring the wheel opposite the point where grinding is to start. Axial movement of the workhead may also be accomplished by turning the knurled knob to the left of the handwheel. The wheelhead may be adjusted on a turret to a maximum of 40 degrees on each side of center so as to meet any conceivable requirement for positioning caused by

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GROUND FROM SOLID BURS

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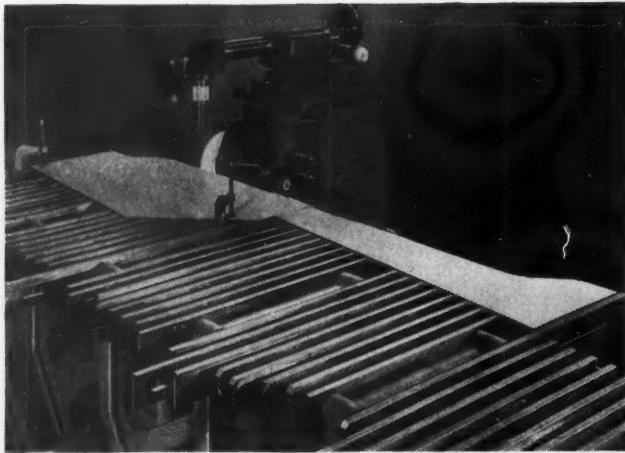


Illustration showing work support parallels of Sheffield Template Grinder which are adjusted to the profile to be ground so as to furnish firm support at all points

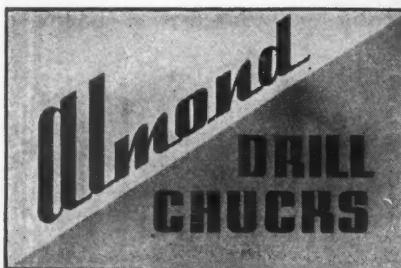
shoulders and other irregularities of the profile to be ground.

The grinding wheel reciprocating slide is then properly positioned for the required stroke within a range of 0 to $1\frac{1}{4}$ inches. The speed of reciprocation may

be set at either 50 to 100 strokes per minute.

The wheel is brought into the work by a manual cross slide feed handwheel. Two ratios of cross feed (fast and slow) are provided. The operator views the

work through a 20 power microscope in setting the wheel to the work and in performing the grinding operation. He guides the microscope cross hairs along the lines of the scribed work by means of the cross slide handwheel as the wheel-



● The Almond Three Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks!

ALMOND THREE JAW DRILL CHUCKS are furnished in 9 sizes with capacities from $3/16''$ to $1''$. These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole. For Portable Drills.

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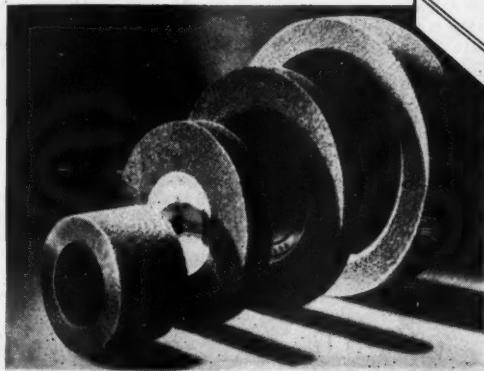
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Proved on the toughest as well as on the most delicate of jobs . . . and their performance *approved* by workers who take pride in grinding perfection and by management with an eye on output and costs . . . that's the record of SAFETY Grinding Wheels over many years in foundries and machine shops everywhere!

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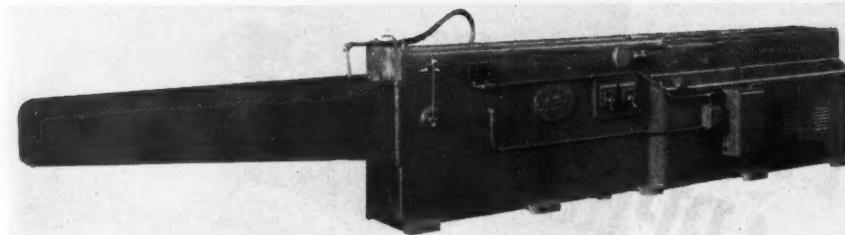
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American Horizontal Broaching Machine

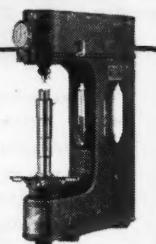
head travels transversely. Four different reticles having diameters respectively of 0.005, 0.0075, 0.010 and 0.015 inch are provided with the microscope to be used for grinding work to varying degrees of precision.

American Horizontal Broaching Machine

A horizontal broaching machine which is designed to perform a wide variety of

internal and surface broaching operations is announced by the American Broach & Machine Co., Ann Arbor, Mich. The machine is said to be particularly adapted to heavy duty broaching involving the removal of a large amount of metal or the broaching of large work-pieces.

The American Horizontal Broaching Machine features a rolled wall construction which, in effect, forms double walls throughout the bed and thus lends maximum strength and rigidity to the base. Available as an added feature is an outer


CLARK HARDNESS TESTER

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Gives Continued Accuracy, Rapid Measurements

THE CLARK has everything you want in a hardness tester—direct reading precision dial, durable construction, ease of servicing. Three standard models shipped complete with weights, dust protectors, diamond and steel penetrators, test blocks, and anvils.

CLARKATOR CHECKS DIAL INDICATORS with micrometer speed and sine bar accuracy. Easy to operate—just four simple steps. Complete instructions permanently fastened to base.

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Here's what we mean by

VICE-GRIP JAW



SPECIFICATIONS

MODEL	SIZE	TOOL CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8

With 15° or parallel cutter channel either left or right hand.

Exclusive in Clark Adjustable Tool Holder

Equalized pressure over *full* length of cutter channel — screw-operated jaw runs right to cutting edge, hugs bit so it can't slip, sag, or break! Takes 4 or more sizes of square, round, short or narrow tool bits. Parallel models for carbide bits, threading tools and boring bars.



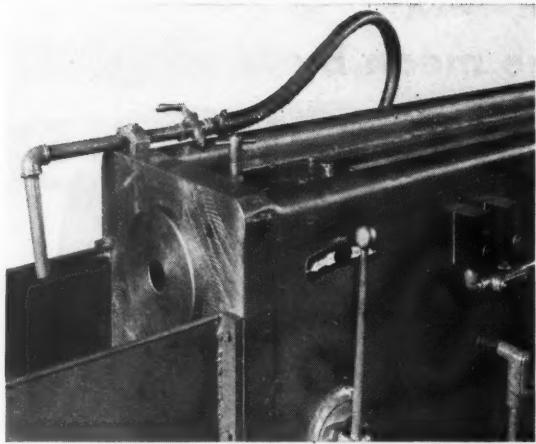
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CLARK CUTTERS

Robert H. Clark Company

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Close-up view of machine controls



tate movement.

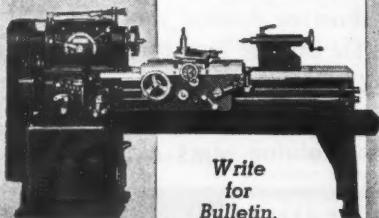
The American Horizontal Broaching Machine is supplied in two standard sizes designated as the Models HD-15-66 and HD-20-66. Specifications of the Model HD-15-66 are as follows. Normal capacity, 15 tons; maximum capacity, 19 tons; maximum stroke, 66 inches; maximum broach length, approximately 72 inches; broach speed, 15 to 29 f.p.m.; return speed, 41 f.p.m., bore in faceplate, 7 inches; maximum distance from face-

plate to pull slide, 5 inches; thread in pull slide, 2-inch 8; front work face, 18 inches wide x 41 inches high; floor space, $2\frac{1}{4}$ x 15 feet; floor space with outer support, $2\frac{1}{4}$ x 24 feet; net weight, approximately 9,000 pounds.

Specifications of the Model HD-20-66

support table which provides a guide for the broach rear pilot and an automatic support jack for the broach shank. Designed to eliminate manual handling of the broaching tool, this attachment includes a slide which is equipped with ball bearings to reduce wear and facil-

CARROLL AND JAMIESON LATHES 15" AND 16"



12 Speed Geared Head Motor Drive Timken Mounted Spindle.

Modern Design—
Liberal Dimensions.

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MAXWELL RECESSING TOOL

Made in four standard sizes:

1. $\frac{1}{8}$ " to 1" Cap.
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4. 3" to 4" Cap.

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A Rugged Tool for Precision Work.

Will cut one or more grooves any shape or form.

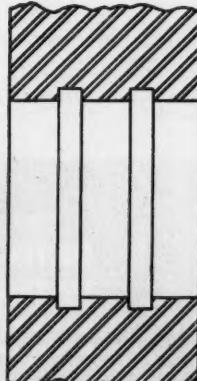
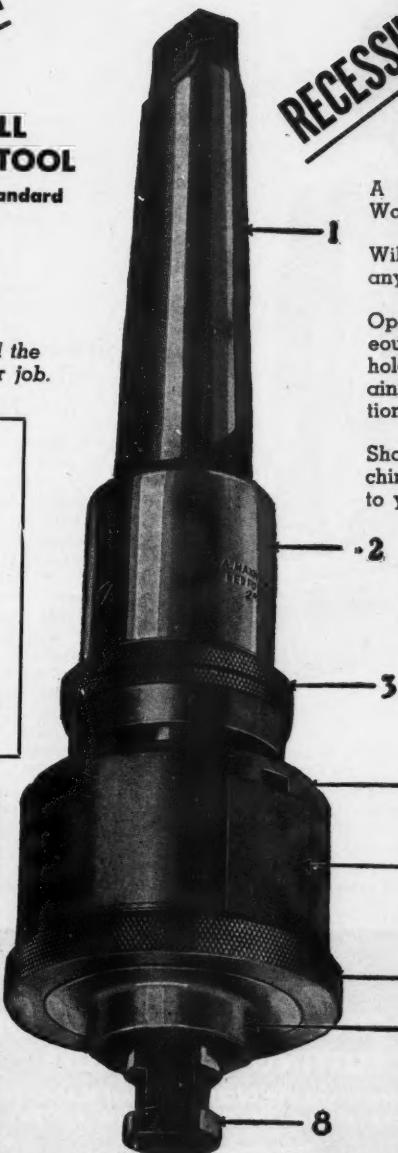
Operation is almost instantaneous, just enter tool pilot in hole and feed to stop. Maintains uniform depth on production runs.

Shanks made to fit your machine, pilots and cutters made to your specifications.

• 2 Adaptable to Drill Press, Boring Mill, Turret Lathe, Milling Machine, etc.

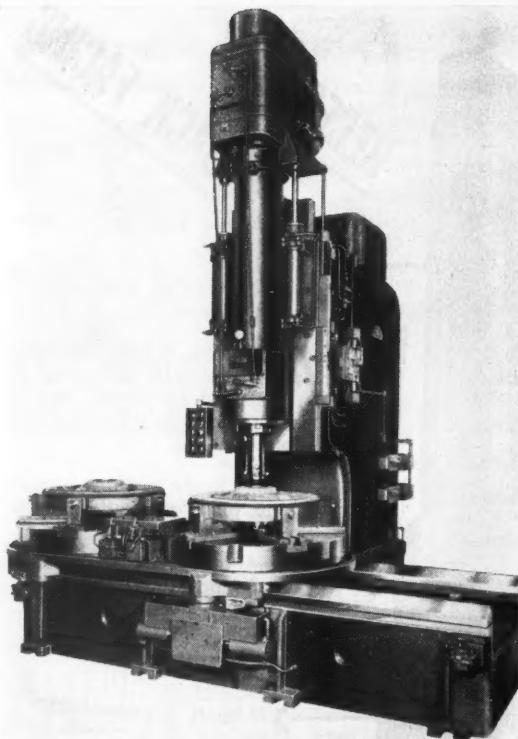
FEATURES

- 1—SHANK
- 2—SLEEVE
- 3—STOP COLLAR
- 4—BODY
- 5—TOOL BLOCK
- 6—PILOT RET. COL.
- 7—PILOT (Ball Bearing)
- 8—CUTTER



F. A. MAXWELL COMPANY • Bedford, Ohio

Snyder Special Railroad Car
Wheel Boring Machine



8; front work face, 18 inches x 41 inches wide, floor space, $2\frac{1}{2}$ x 15 feet; floor space with outer support, $2\frac{1}{2}$ x 24 feet; net weight, approximately 10,000 pounds.

Snyder Special Railroad Car Wheel Boring Machine

A special-purpose automatic-cycle machine for rough and finish boring wheels for railroad cars has been built by the Snyder Tool & Engineering Co., 3400 E. LaFayette St., Detroit 7, Mich. According to the manufacturer, on steel wheels, the cutting time for finish boring $\frac{1}{8}$ -inch stock per side is 1 minute 20 seconds for a hole 7 inches long x 7 inches in diameter. The same amount of stock is said to be removed from cast iron

wheels in 50 seconds. The cutting tools employed are tungsten carbide tipped. The chamfering and facing of a $1\frac{1}{2}$ -inch flange may be performed simultaneously with the boring operation. A 19-inch stroke provides for rough and finish boring in succession.

Spindle feeds of the machine range

are as follows: Normal capacity, 20 tons; maximum capacity, 28 tons; maximum stroke, 66 inches; maximum broach length, approximately 72 inches; broaching speed, 14 to 20 f.p.m.; return speed, 28 f.p.m.; bore in faceplate, 7 inches; maximum distance from faceplate to pull slide, 5 inches; thread in pull slide, 2-inch

LUERS

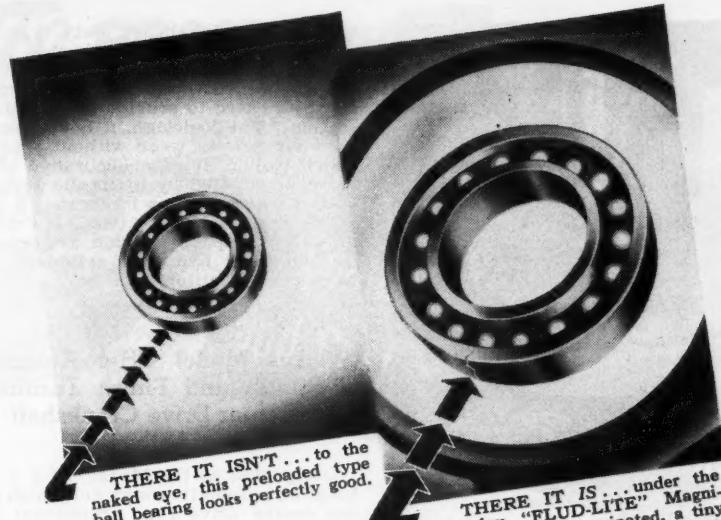
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ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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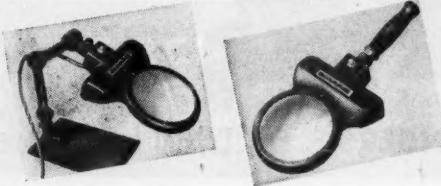
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Where the limits of ordinary vision stop, that's where Stanley "FLUD-LITE" Magnifiers take over. They show your precision workers and inspectors a whole new world of "unseen" opportunities to refine and make more uniform every product you make. They show up the differences that make all the difference.

That's worth a lot of money to you... but the cost is very small. And they're typical Stanley production aids. A 5" diameter magnifying lens with a 13" focal length is mounted in a friction-arm,

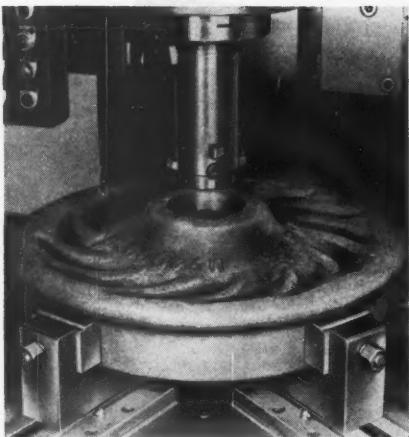
swivel-jointed bench frame, without base for permanent mounting on machines or in a portable hand-tool frame. Shadow-free fluorescent illumination is scientifically focused. Easily adjustable to individual worker's vision and position.

"FLUD-LITE" Magnifiers help your workers do better work by helping them to see better. That's good sense, good investment. Now available for prompt delivery. Call your distributor or write for illustrated folder. Stanley Electric Tools, New Britain, Connecticut.



STANLEY

STANLEY ELECTRIC TOOLS



Close-up view of boring tool and car wheel set up for machining

from 2 to 24 inches per minute, and various spindle speeds are provided through the use of a four-speed selective transmission or a variable speed motor. The

spindle is of the heavy duty type with taper roller bearing mounting.

The table travels on V-ways which are case hardened, ground, and automatically lubricated to provide for smooth operation. The V-design, it is claimed, allows for normal wear without side play which would impair accuracy. Table travel is effected by hydraulic actuation with a 5-second time interval.

The work is held by two 5-jaw chucks of 42-inch capacity which are operated by individual hydraulic cylinders. The work cycle is automatic.

Wickes Model CH-4 Automatic Rough and Finish Turning Center Drive Crankshaft Lathe

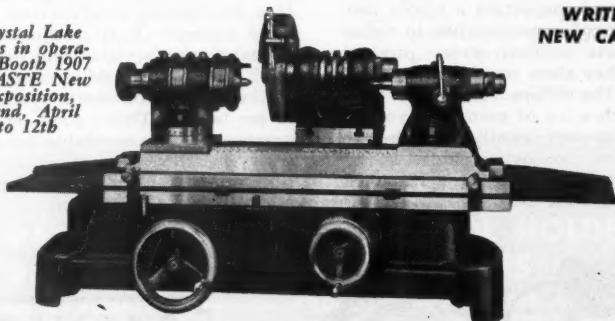
Designated as the Model CH-4, a combination automatic rough and finish turning center drive type crankshaft lathe designed for all turning operations prior to hardening or finish grinding on all main line bearings and ends of automotive and similar crankshafts where production is high is now being manufac-

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Combination Center Drills
and Counter Sinks to Work!**

Their built-in performance features insure production-line speed, economy and dependability. Made of high speed steel, Circle "R" Combination Center Drills are listed below for your convenience.

DIMENSIONS

No.	Size	Dia. Body	Dia. Drill	Length Overall
700	A-1	$\frac{1}{8}$ "	$\frac{3}{16}$ "	$1\frac{1}{4}$ "
701	C-2	$1\frac{1}{16}$ "	$\frac{1}{16}$ "	$1\frac{1}{8}$ "
702	D-1	$1\frac{1}{16}$ "	$\frac{5}{32}$ "	2"
703	E-1	$\frac{3}{16}$ "	$\frac{3}{32}$ "	$2\frac{1}{8}$ "
704	E-2	$\frac{3}{16}$ "	$\frac{1}{8}$ "	$2\frac{1}{8}$ "
705	F-1	$\frac{5}{16}$ "	$\frac{3}{32}$ "	$2\frac{3}{4}$ "
706	F-2	$\frac{5}{16}$ "	$\frac{3}{16}$ "	$2\frac{3}{4}$ "
707	J-1	$\frac{1}{2}$ "	$\frac{7}{32}$ "	3"
708	J-2	$\frac{1}{2}$ "	$\frac{9}{32}$ "	3"
709	M-1	$\frac{5}{8}$ "	$\frac{7}{32}$ "	$3\frac{1}{8}$ "
710	M-2	$\frac{5}{8}$ "	$\frac{9}{32}$ "	$3\frac{1}{4}$ "
711	N-1	$\frac{3}{4}$ "	$\frac{1}{4}$ "	$3\frac{1}{2}$ "
712	N-2	$\frac{3}{4}$ "	$\frac{5}{16}$ "	$3\frac{1}{2}$ "

REGULAR TYPE



GROUND WITH RADIAL RELIEF

Included angle 60 degrees. Other angles made special to order.

ARBOR TYPE



GROUND WITH RADIAL RELIEF

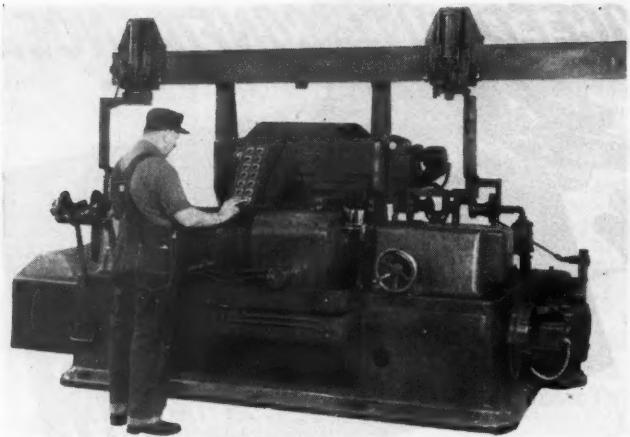
Special lengths and diameters to meet your requirements.

Prices on Application.

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PROVIDENCE 5, R. I.

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Wickes Model CH-4
Automatic Rough and
Finish Turning Center
Drive Crankshaft
Lathe

tured by Wickes Brothers, Saginaw, Michigan.

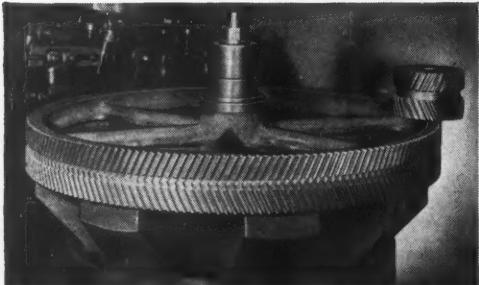
The machine is equipped with hydraulic feed and is completely automatic in operation, rough turning the main line bearings first with divided tools both front and rear and then automatically

shifting the finishing tools into position and finish turning completely with divided tools both front and rear. A power operated loading and unloading device is provided. The machine is also equipped with a synchronized variable

speed and feed mechanism to maintain both the surface speed and tool feed at the maximum permissible throughout the entire cycle.

The Wickes Model CH-4 Crankshaft Lathe is rigidly constructed to provide for maximum accuracy and incorporates

If it's a gear
ATLANTIC
can make it



We have the universal equipment and the experienced personnel to produce any type of gear, standard or special, any size up to 5 ft., any material, any required quantity. Speedy, careful, courteous attention, with particular emphasis on breakdown jobs and emergency orders.

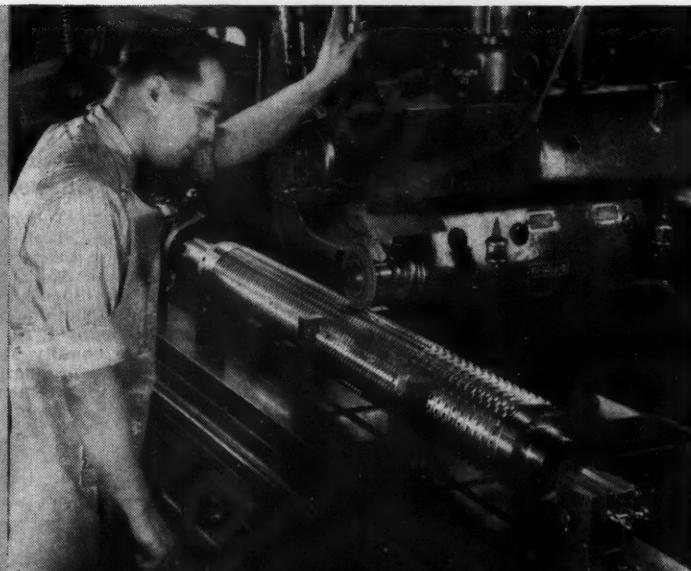
Send us your blueprints or gear samples for our quotations and delivery dates.

ATLANTIC GEAR WORKS
200-B LAFAYETTE ST.
NEW YORK 12, N. Y.
Phone: CANal 6-1440



Continental CUTTING TOOLS

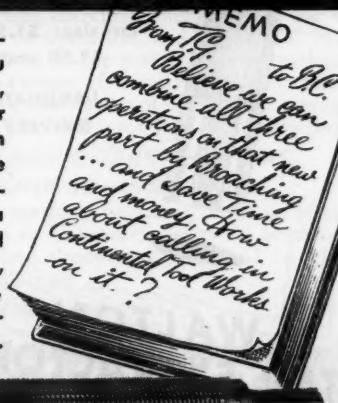
- Boring Bars and Tools
- Broaches
- Broach Pullers
- Broaching Fixtures
- Core Drills
- Counterbores and Countersinks
- CTW Drive Holders
- Counterbores (Tool Room Sets)
- Counterbore Pilots
- Inserted Blade Cutters
- Carbide Tipped Cutters
- Form Relieved Cutters
- Milling Cutters
- Thread Milling Cutters
- End Mills
- Side Mills
- High Speed Steel Reamers
- Carbide Tipped Reamers
- Shell Reamers
- Inverted Spotfacing
- High Speed Steel Tool Bits
- Carbide Tipped Tool Bits
- Circular Form Tools
- Cut-off Tools
- Flat Form Tools
- Dovetail Form Tools



CONTINENTAL BROACHES

Precision Ground by Experts

The 26 years experience of Continental engineers assures you that each broach is exactly fitted, in design and workmanship, for the job it is intended to do. Each is ground to exceptionally close tolerances by a skilled broach-maker. Continental makes a complete range of internal and external (surface) broaches, fixtures, holders and pullers, all to the same high standards. Call Continental today.



CONTINENTAL TOOL WORKS
DIVISION OF EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

46-33

BROKEN TAPS Out in a Jiffy!



The Walton Tap Extractor beats makeshift methods—saves time and money. It's insurance against trouble.

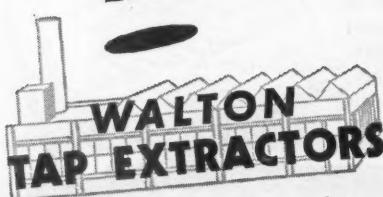
With a range of sizes to meet your needs you'll no longer be faced with production slowups caused by broken taps.

We'll show you how, and tell you about our reconditioning service for worn and damaged extractors.

Write for Folder No. 10.

List prices of popular sizes \$1.50 to \$2.20 each.

IMMEDIATE
DELIVERY

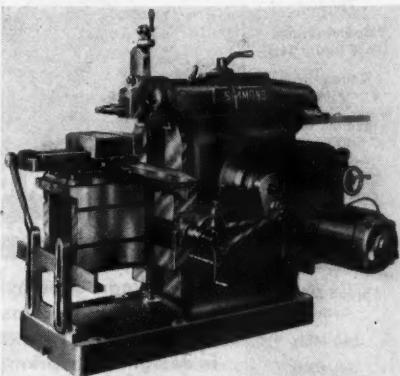


The WALTON Company
94 ALLYN STREET • HARTFORD, CONN.

features for convenience in loading, chucking, and so on. The weight of the machine with electrical equipment is approximately 30,000 pounds.

Simmons 20-Inch Micro-Speed Shaper

A 20-inch shaper incorporating a variable speed drive which provides an unlimited range of speeds to the ram at the turn of a handwheel, to be known as the Simmons Micro-Speed, is announced by the Simmons Machine Tool Corp., N. Broadway, Albany 1, N. Y. The machine is said to be equally suited to the demands of heavy production work and to the exacting requirements of toolroom work.



Simmons 20-Inch Micro-Speed Shaper

The Simmons 20-Inch Micro-Speed Shaper has a maximum ram stroke of $20\frac{1}{4}$ inches, horizontal travel of 23 inches, and vertical travel of $16\frac{1}{2}$ inches. The maximum distance from the table to the ram is $16\frac{1}{4}$ inches. The column of the machine is extremely well ribbed for strength and rigidity, with the bull gear bearing carried on a convex side wall for maximum resistance to thrust loads and equal stress distribution to the frame. The clutch is of the dry multiple-disc type and can be simply adjusted. A fine feed range of 0.006 inch for finishing cuts and of 0.080 inch for roughing cuts is available.

All gears in the driving train are helical for smooth and quiet operation. The

QUICK MARKING FOR PART NUMBERS!

MODEL 25
HI-DUTY
MARKING
MACHINE



MARKING
BY ROLLING
IS **FAST-**
ECONOMICAL!



Requires only a fraction of the applied pressure normally used for stamping—Thus preserving piece parts and adding to the life of your dies.

RAPID SET-UPS

The economy of rolled marking is self-evident, due to its speed and ease of operation, and HI-DUTY Machines are designed by us for practically any marking operation. It will operate efficiently from your plant air line and will give many years of satisfactory service, largely due to the care that went into its engineering.

**IF IT'S WORTH MAKING, IT'S WORTH MARKING.
IF IT'S WORTH MARKING — MARK IT WELL.**

Have you a tough marking problem? Send us prints or samples of parts to be marked—showing lettering, location and required production—We will be glad to make recommendations.

Designed and Built by



GEO.T. SCHMIDT, INC.

**1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS**



LeMaire Special Purpose Drilling and Tapping Machine

heavy duty vise with hardened steel jaws, which is supplied as standard equipment of the shaper, can be swiveled through 360 degrees.

LeMaire Special Purpose Drilling and Tapping Machine

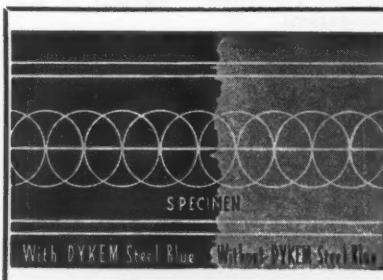
A special purpose machine utilizing five standard hydraulic power units and one lead screw tapping unit has been designed by the LeMaire Tool and Manufacturing Co., Dearborn, Mich. The machine is constructed to drill, ream, bore, counterbore, chamfer, and tap wheel cylinders all at one setting at a rate of approximately 840 pieces per hour. By having all of these operations performed while the part remains in a fixed position on the machine, the manufacturer claims that maximum accuracy in finished parts can be achieved.

Four parts are held at one time in each fixture by being clamped by means of an air cylinder and released by a cam rail. Brackets mounted on each end of the fixture contain two bushings which nest pins on the bushing plates of the drilling units and head of the tapping unit to assure positive alignment. The machine itself consists of five LeMaire No. 2000 self-contained hydraulic drilling units and one LeMaire No. 150 lead screw tapping unit mounted at various angles on a fabricated base which supports a 7-station 54-inch diameter automatic index table.

The cycle of operations is as follows: Station 1, loading and unloading; Station 5, drill deep holes; Station 6, combination counterbore and for 118-degree seat; Station 7, tap.

Thomas Open Back Inclinable Press

An open back inclinable press in 50, 75, and 100-ton capacities is now being produced by the Thomas Machine Manufacturing Co., Pittsburgh 23, Pa. Construc-



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy. Write for full information.

THE DYKEM COMPANY

2301 F. NORTH 11TH ST.

ST. LOUIS, MO.

(In Canada: 444 Pacific Ave., Toronto, Ont.)

IT'S A MATTER OF RECORD . . .

**MORE HOLES
at LESS COST**

WITH **Shankless***

Republic's NEW ROLL-FORGED DRILL

• Even if you paid more for them, they'd cut your drilling costs. Actually you pay less for this better, tougher, longer-lasting drill. The efficiency of this new kind of drill has been proved; hundreds of thousands of them have been used on high precision work. If you are now using taper-shank drills, it will pay you to put "Shankless" drills to the test on your own operations.

Write for YOUR FREE COPY OF REPUBLIC'S NEW MANUAL NO. S-4 WHICH TELLS A COMPLETE STORY OF THE "SHANKLESS" DRILL.

* Registered at U.S. Patent Office.



Republic DRILL & TOOL COMPANY
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BOSTON • NEW YORK • PHILADELPHIA • PITTSBURGH • CLEVELAND • DETROIT • DAYTON • BIRMINGHAM • LOS ANGELES • SAN FRANCISCO
WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF TWIST DRILLS

MANY USES— BIG SAVINGS WITH **CERRO** LOW TEMPERATURE MELTING **ALLOYS**

CERROMATRIX—250° F. For securing punch and die parts; anchoring machine parts; short run forming dies, etc.

CERROBEND—158° F. As a filler for bending thin-walled tubing—melts out in boiling water. Also used for automotive and aircraft assembly jigs, forming dies, etc.

CERROSAFE—165° F. - 190° F. Used for proof-casting cavities in molds, forging dies, duplicate patterns, etc.

CERROBASE—255° F. Used in electroforming dies, molds, etc.

CERROTRU—281° F. Metal molds for wax patterns used to make precision castings.

CERROLOW — 117° F. — **CERROLOW** — 136° F. and **CERROLOW** — 174° F.

REPRESENTATIVES AND DISTRIBUTORS

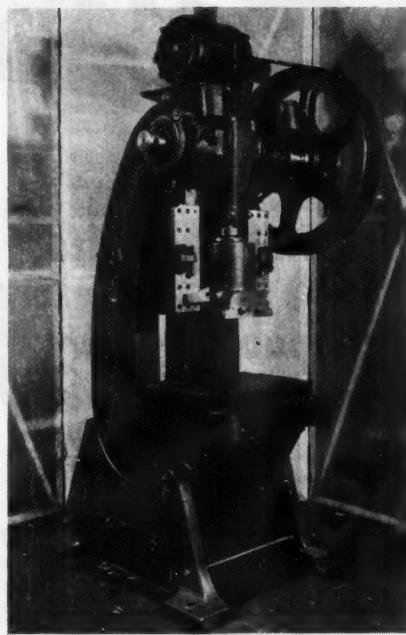
Brooklyn, N. Y., Belmont Smelting and Refining Works
Ansonia, Conn., Jackson Associates
Boston, Mass., Jackson Associates
Philadelphia, Pa., Castaloy Metal Sales Co.
Cleveland, Ohio, Die Supply Co.
Detroit, Mich., Castaloy Metal Sales Co.
Chicago, Ill., Sterling Products Co., Inc.
Moline, Ill., Sterling Products Co., Inc.
Milwaukee, Wis., Williams & Collins
Minneapolis, Minn., Northern Machinery & Supply Co.
St. Louis, Mo., Metal Goods Corporation
Kansas City, Mo., Metal Goods Corporation
New Orleans, La., Metal Goods Corporation
Dallas, Tex., Metal Goods Corporation
Houston, Tex., Metal Goods Corporation
Los Angeles, Calif., Castaloy Metal Sales Co.
Tulsa, Okla., Metal Goods Corporation
Toronto, Canada Metal Co., Ltd.
London, Eng., Mining & Chem. Products, Ltd.

Cerro De Pasco
Copper Corporation

40 WALL ST. NEW YORK 5, N. Y.

tion features of the machine include a one-piece forged high carbon steel crank-shaft of unusually rigid design with ground and polished bearing surfaces. The unusually large bronze bushed main bearings employed are of the 45-degree split type, transmitting the thrust directly to the frame which is of semi-steel, well seasoned and of high tensile strength without excessive weight. Lubrication is provided over the entire length of the gibs, which are adjustable and easily replaced.

The well-balanced flywheel of the press includes a hub which is so designed that



Thomas Open Back Inclinable Press

the tool steel driving and backing blocks can be replaced when worn. The flywheel is arranged so that it can be backed up without damage to clutch mechanism.

The Thomas Open Back Inclinable Press also features a massive Pitman connected with the slide by a heavy screw of the ball and socket type. Provision is made for a knock-out bar in all sizes of the press. A unique feature of the machine is a patented safety clutch,

**SPECIAL
CUTTING TOOLS
AND GAGES**

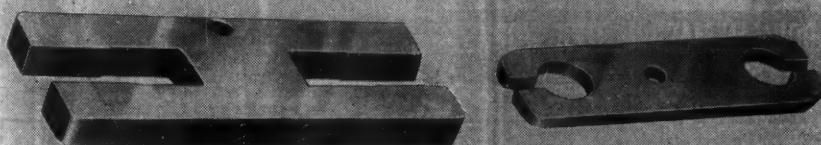


MADE JUST AS YOU WANT THEM

Every order of special cutting tools and gages we produce is handled just as if we were making them for our own use.

We give each tool and gage the most careful attention. Where we do the designing we give full consideration to its use. Machining is done painstakingly—with constant supervision. Our testing is rigorous. In fact, we try to make your tools just as you would want them made.

Send us your inquiries for speedy estimates and prices that are attractive, quality considered.



WARREN INDUSTRIES



WARREN, MICHIGAN

permitting single-stroke non-repeat or continuous operation at the will of the operator. Means are provided for locking the press out of operation when setting dies or making other adjustments. All clutch parts are interchangeable and those subject to wear are of alloy steel which is carefully heat treated.

An additional feature of the press is a safety stop incorporated in the shaft. In the event the brake should fail to stop the shaft at the top center, the safety stop will, it is claimed, prevent accidental dropping of the slide. The brake is self adjusting.

DORMAN
Tappers

FRICITION DRIVE AND
POSITIVE DRIVE . . .
AUTOMATIC REVERSE

Delivery From
Stock Some Sizes.

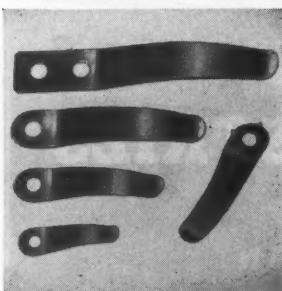


No. 1 Friction Tapper drives from 2-56 tap to $\frac{3}{8}$ " tap in steel or any other material. Simple adjustment changes light friction to positive drive or any intermediate stage.

No. 2 Positive Tapper drives from $\frac{3}{8}$ " to $\frac{3}{4}$ ".

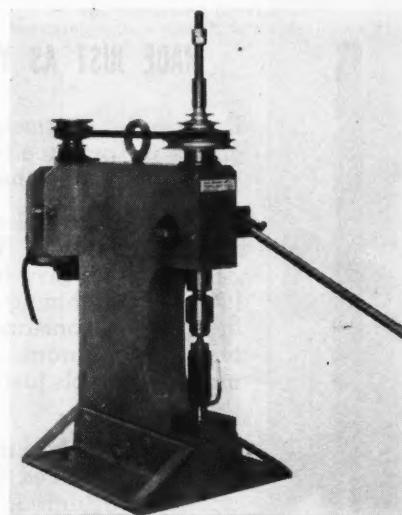
No. 3-A Positive Tapper drives from $\frac{1}{2}$ " to $1\frac{1}{4}$ " in steel or other material. Floating Chuck Jaw automatically centers tap. Write for details.

DORMAN MACHINE TOOL WORKS
357 CANAL ST. • NEW YORK 13, N.Y.



Topflight Improved Spin Dimpler

Designed with a view toward eliminating dimpling difficulties, an improved dimpler that forms dimples by spinning is announced by the Topflight Tool Co., York, Pa. According to the manufacturer, the dimples produced in high stressed aluminum and magnesium metals by means of the unit are free of cracks and a sharp corner at the face of each sheet is obtained.



Topflight Improved Spin Dimpler Installed in
Special Yoke

So as to make the operation of the dimpling unit as easy and efficient as possible, the unit is employed in connec-

ALSCO Self-Locking Tool and Die Makers' Springs

Tool and die shops, press rooms, machine shops, etc., will find these handy neat looking springs the answer to their flat spring requirements. They cost but a fraction of hand made springs. Made in four lengths from 1" to $2\frac{3}{4}$ " and eight thicknesses from .010 to .032.

IMMEDIATE SHIPMENT FROM STOCK.
SAMPLES AND PAMPHLETS UPON REQUEST.

ALSCO COMPANY, 1770 Stone Road, Rochester 13, N.Y.

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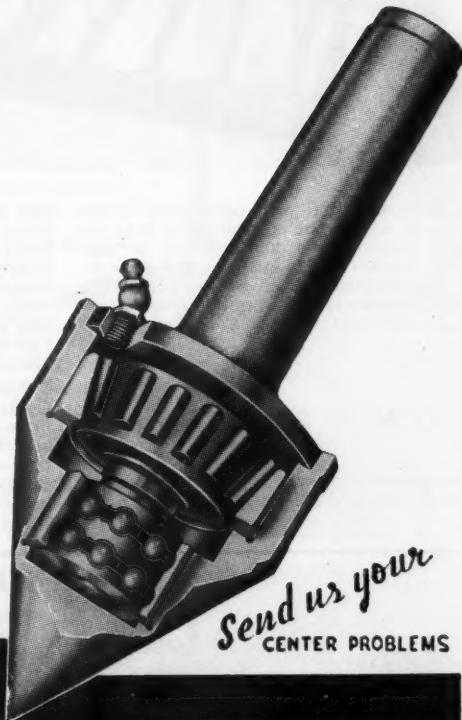
IMPROVEMENT

On the constant improvement of the tools of production, rests the future prosperity of American industry.

Improve your machine tools with Marveco Live Centers.

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GUARANTEED to OUT-PERFORM and OUTLAST any other LIVE CENTER.

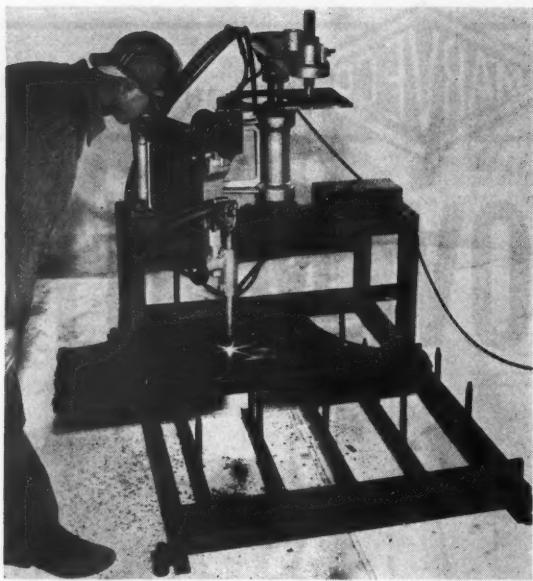
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Send today for free Catalogue "THE MARVELS OF MARVECO."



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**MARVEL
TOOL & MACHINE COMPANY**

10981 W. JEFFERSON AVE., RIVER ROUGE 18, MICHIGAN



O.M.W. Shape Cutting Machine

tion with a special yoke (available to the trade) in which the spin dimpler may be easily operated by semi-skilled or unskilled workers, it is stated. The accompanying illustration shows the yoke with spin dimpler attached, ready for a dimpling operation.

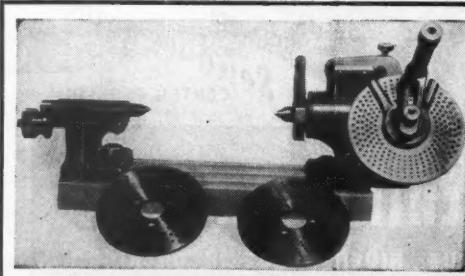
O. M. W. Shape Cutting Machine

Simplicity of templet making and ease of operation are outstanding advantages

claimed for the O. M. W. Shape Cutting Machine now being manufactured by the Ohmstede Machine Works, 897 N. Main St., Beaumont, Texas. The machine is designed to cut an unlimited variety of shapes and can be used either as a portable or stationary device. It is of unit-type construction and thus may be moved easily whether mounted on a portable or semi-stationary base.

According to the manufacturer, the use of high strength aluminum alloys make the O. M. W. Shape Cutting Machine stable and rigid under all conditions. Oversize anti-friction bearings incorporated in the aluminum alloy arms of the unit are completely sealed from foreign material. The variable speed motor is equipped with a special filter to ensure long life. All controls of the machine are conveniently located for the operator. The cutting speed of the unit can be readily varied by adjusting rheostats located on the control panel.

Specifications of the O. M. W. Shape Cutting Machine are as follows: overall dimensions, 36 x 60 inches; thickness with standard blowpipe, 8 inches; circle cutting, 0 to 30 inches; straight-line cutting, 65 inches; cutting speed range, 3 to 30 inches; electrical requirements, 115 volts



PLAIN DIVIDING HEAD IMMEDIATE SHIPMENT FROM STOCK

6" swing. Overall length 6 $\frac{3}{4}$ ". Base 3 $\frac{1}{4}$ "x2x3". Spindle has No. 7 B&S taper and take-up collar for end thrust. Threaded spindle nose 1 $\frac{1}{8}$ " dia., 12 thds. U.S.S. Plates cover entire range of B & S chart. Worm wheel ratio 40:1. Complete with 3 dividing plates, 4" dia., one 24-notch indexing plate and tailstock. \$125.00 f.o.b. Cincinnati. Write for catalog of machines and attachments.

JEFFERSON MACHINE TOOL CO.
702 West 4th St., Cincinnati 3, Ohio

The SUPER METHOD



of TRIMMING FORMED PARTS and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.

Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.



FRICITION SAWING

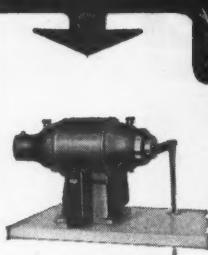
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Tannewitz

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Free Copy

HIGH SPEED BAND SAWS

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

IDEAL SPEED LATHES



For accurate, uniform,
speedy finishing of
metal & plastic parts.

POLISH LAP DE-BURR FINISH

For speedy, low-cost finishing of screws, studs, bushings, push rods, etc., investigate Schauer Speed Lathe NAE: Motor, brake, and collet operated by a single foot treadle.

If You Have a Finishing Problem
WRITE FOR CATALOG 440

SCHAUER MACHINE COMPANY

ORIGINATORS OF TODAY'S SPEED LATHES
2869 READING ROAD — CINCINNATI 2, OHIO

STANDARD



SINCE 1915

HEADS

FIVE
TYPES

FIFTY-SIX
SIZES



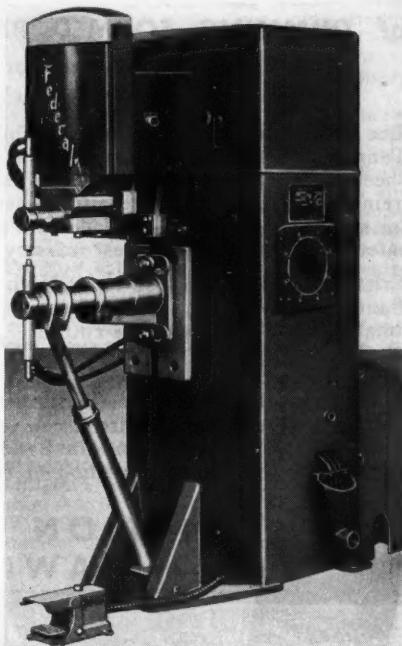
Two Spindle Head
Both Spindles
Adjustable

United States Drill Head Co.
Cincinnati 4, Ohio

(a.c. or d.c.); net weight with semi-stationary base, 534 lb.; net weight with portable base, 347 pounds.

Federal PH-1 Series Hydraulic Press Welder

Designated as the PH-1 Series, an automatic, hydraulically operated, press type welder in 30, 50, and 75 kva. capacities suitable for either spot or projection welding has been announced by the Federal Machine and Welder Co., Warren, Ohio.



Federal PH-1 Series Hydraulic Press Welder

An unusual feature of the machine is the inverted type hydraulic cylinder through which welding pressure is applied. The cylinder is a part of the slide or ram, while the piston is the so-called fixed member, its upper end being secured to the top of the welder by a heavy transverse adjustable spring. This



**TIRELESS POWER
drives them
SKILLED HANDS
guide them**

THE prerequisites to maximum performance in rotary files are: High-quality high-speed steel; keen, accurate cut; "no wobble" (true-centered shaft and perfect radius at all cutting circumferences).

That you get all these qualities in Nicholson Rotary Files is sensed in the guarantee which has supported Nicholson hand files for three generations: *Twelve perfect files in every dozen.*

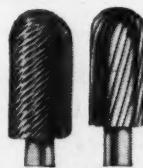
WRITE FOR CATALOG AND PRICE LIST—and for any special information you desire. For deliveries, consult your mill-supply house.

**NICHOLSON FILE CO., 93 ACORN ST., PROVIDENCE 1, R. I.
(In Canada, Port Hope, Ont.)**

**NICHOLSON ROTARY FILES
HAND CUT AND GROUND—FOR EVERY PURPOSE**

16 STANDARD SHAPES

*(In either Hand Cut or Ground.)
3 cuts—Coarse,
Medium, Fine.
Stock diameters—
 $\frac{1}{8}$ " to $1\frac{1}{8}$ ".*



HAND CUT GROUND

NICHOLSON
X
U.S.A.

spring serves a dual purpose; namely, it actuates a switch initiating the timing controls and provides a quick "reaction" for a fast follow up on the welding stroke. Welding pressure is adjusted by a hydraulic pressure regulator and gage.

After the welder has been set for a specific job, the operator has but one control to consider, this being a foot switch attached to a flexible cable which permits easy positioning for each job. A single light depressing and release of the foot switch puts the welder through one complete welding cycle. The speed of the weld is governed by timing controls.

Automatic recycling is said to continue as long as the switch is held in contact.

Water-cooled transformers and water-cooled electrodes are standard equipment, and water-cooled horns, which are available on special order, are recommended for most installations. The Federal PH-1 Series Hydraulic Press Welder is available in three sizes with an overall range of "work capacity" embracing 26 to 6 gauge steel sheets or comparable material.

Beaver Solid Carbide Blade Face Mill

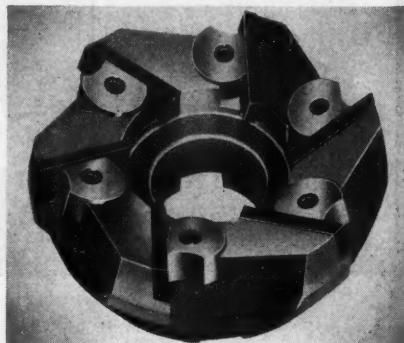
Designed to provide for unusually long tool life together with maximum flexibility of operation, a solid carbide blade

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FAST
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AND
SERIAL NUMBERING
WITH HERCULES HOLDERS AND
SHOULDER TYPE
WRITE FOR LITERATURE

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Company

9 MORRELL ST., ELIZABETH 4, N. J.

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"Marking
Specialists"
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Problems



Beaver Solid Carbide Blade Face Mill

face mill which is said to require a minimum of horsepower in performing milling operations is announced by the Beaver Tool and Engineering Corp., 2850

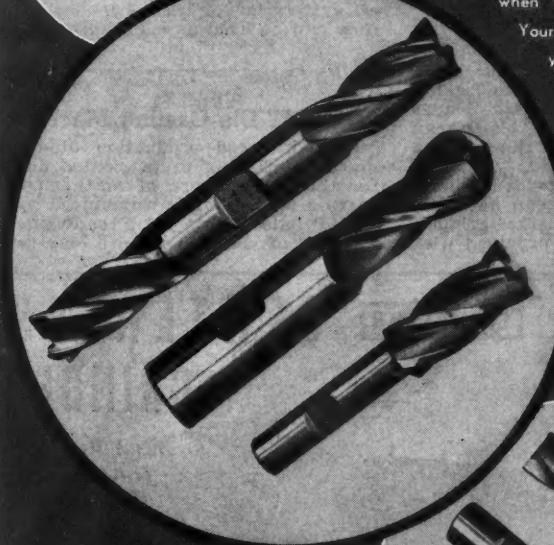
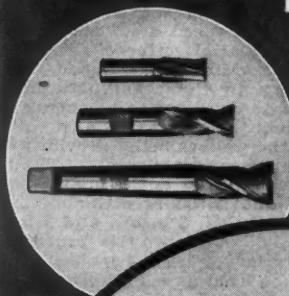
H.S. Drills, Milling Cutters, Lathe Tools, H.S. and C.S. Taps and Dies, Drill Chucks, Lathe Chucks, Tailstock Turrets, Bed Turrets, Files, Special Taps and Dies, etc.

*A Complete Line
of Machine Shop
Equipment*

Send for Our Catalog and Price List

CENTER TOOL CO., 151 CENTRE STREET, N. Y.
13

Perfected for Production
... by UNION

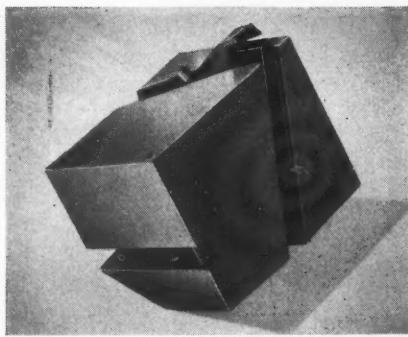


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when we perfected Union Tools.

Your requirements — and
your practical shop experiences
have helped us
design tools which will
give you better results,
consistent
high accuracy,
consistent low costs.
Keep your production
curve rising! Union —
The Tools You Buy Again —
will help you do it.

UNION TWIST DRILL CO.
ATHOL MASS.

UNION • BUTTERFIELD • CARD Divisions of the Union Twist Drill Co.



Grinding block provided for sharpening
blades of Beaver Face Mill

Rochester Rd., R. 1, Royal Oak, Mich. The design of the tool includes locking wedges which permit the carbide blades to be quickly released. The blades can be reset with equal ease by the use of a dial indicator, it is claimed.

With the simple jig provided, blades for the Beaver Face Mill can be easily and quickly ground on a surface grinder. Although the face mill is provided with

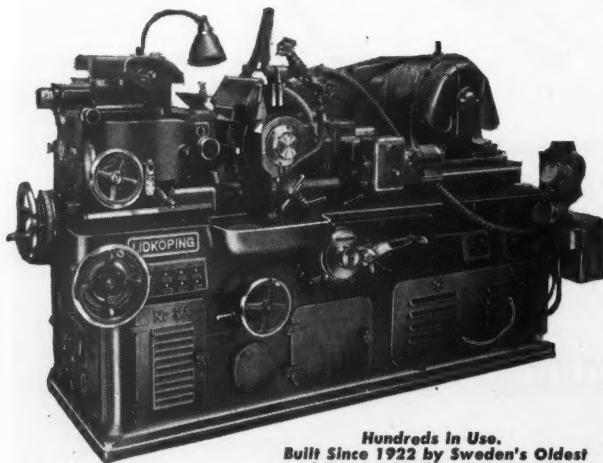
a fixed positive radial rake of 15 degrees, the blades can be sharpened to provide any effective rake angle within the normal range, either positive or negative. Thus, by using different grades of carbide, all materials can be machined with one cutter. Blades of Braecast, Tantung, or high speed steel may also be used with equal effectiveness within the Beaver Face Mill, it is claimed.

According to the manufacturer, the face mill has excellent chip control, deep pockets being provided so that it will not clog and the wedges being provided with curved chip bearing surfaces. The face mill is available in cutter diameters of 4, 6, 8, 10, and 12 inches with body thicknesses of $2\frac{1}{4}$, $2\frac{3}{8}$, $2\frac{1}{2}$, $2\frac{3}{4}$, and 3 inches respectively. A keyway is provided in all cutters larger than 4 inches so that they can be used as side mills.

DCMT Die-Casting Machine

A high speed production die-casting machine utilizing prefabricated die sets for the performance of on-the-spot die casting operations is announced by the DCMT Sales Corp., 401 Broadway, New York, N. Y. Said to require only two to

SWEDISH LIDKÖPING CENTERLESS GRINDERS



**Most Powerful
for Highest
Production**

SEE DEMONSTRATION
AT A.S.T.E. SHOW
CLEVELAND, APRIL 8-12
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For Detailed
Catalog
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MACHINE TOOL
CORP.**

125 Barclay St.
NEW YORK 7, N. Y.



TALIDE METAL MEETS
EVERY REQUIREMENT

"98% More Production per Tool Grind with Talide Tools"

The chief engineer of a prominent manufacturer recently compared performance on different carbide cutting tools on a non-ferrous aircraft part. He reports . . .

"98% More production per tool grind with TALIDE"

Talide tools eliminate much of the conventional "down time" on any cutting job

—turning, boring, or facing. They keep cutting on and on and on.

Universally used for cutting operations on steel, cast iron and non-ferrous metals and non-metallic materials, Talide Tools are guaranteed to slice production costs.

You can obtain Talide tool tips direct from stock or a Talide sales engineer will call and recommend the proper use and grade of Talide Carbides for you.



Send for Catalog 44-T listing standard Talide Tools and Tips.



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YOUNGSTOWN 5, OHIO Pioneers in Tungsten Carbide Metallurgy

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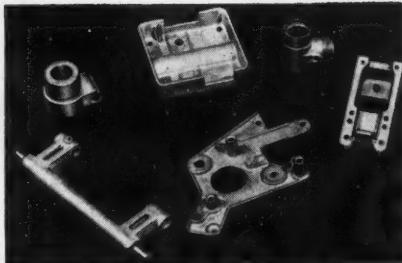
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Reconditioning, salvaging and
converting high speed and car-
bide tipped metal cutting tools.

CONANT TOOL & ENGINEERING CO.

347 WEST 107TH STREET
CHICAGO 28, ILLINOIS



Typical die castings produced on DCMT
Die-Casting Machine

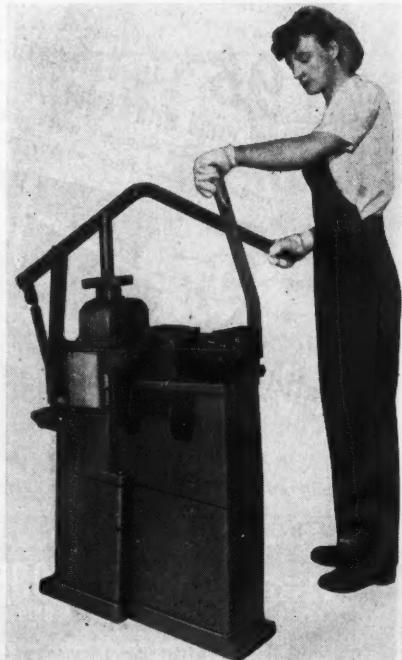
three minutes to set up, the machine can
be economically used for runs as small as
250 parts, while production speeds of 600
shots per hour may be reached, it is
claimed.

Unusually light in weight, the DCMT
Die-Casting Machine is designed for op-
eration by unskilled personnel and is con-

DCMT Die-Casting Machine

An advertisement for the Greaves Cincinnati Streamlined 4-Speed Reamer Driver. It features a large, rectangular motor unit with a circular foot control switch attached to its side. A circular inset shows a close-up of the switch. The main unit has the brand name "GREAVES CINCINNATI" printed on it. Below the unit, there is descriptive text about its features and capabilities.

Complete with motor . . . 4" four-jaw uni-
versal machine tool chuck and foot control
switch. Capacity from $\frac{1}{4}$ " to $1\frac{1}{2}$ " reamers.
Four speeds . . . 30—45—72 and 115 RPM.
Higher speed ranges available. Eliminates
handwork. Speeds production. Mail your or-
der today. The new Greaves streamlined
reamer-driver will come your way — pronto!

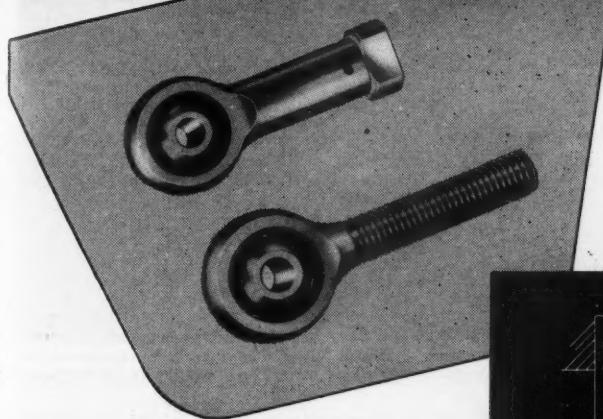




UNIBAL

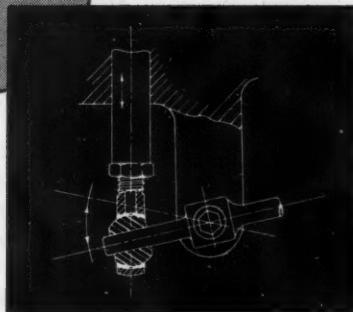
SPHERICAL BEARING ROD ENDS

HERE'S A TYPICAL APPLICATION FOR UNIBAL



The Heim Unibal Spherical Bearing is a self-aligning single ball used either as a self-contained single ball bearing or in a rod end application. For the transmission of motion at odd, varying angles, this Heim Unibal bearing corrects misalignment several degrees in any and all directions. The use of a single ball instead of a double row of ball bearings, provides a greater surface supporting area and prevents breaking and jamming. They are built to carry heavy loads — both radial and axial.

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BOOTH NO. 801
AT THE
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SHOW



Stock sizes are available for immediate shipment. If you need engineering assistance in applying this new Heim Unibal Bearing to your product, we are prepared to give prompt attention.

UNIBAL SPHERICAL BEARINGS AND ROD ENDS

PLEASE WRITE

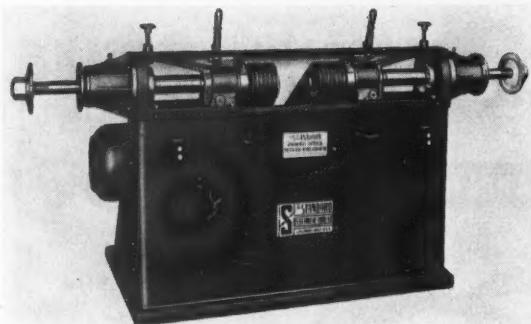
THE HEIM
FAIRFIELD



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"Standard" Extra Heavy Duty
Buffing and Polishing Machine

structed for use with completely prefabricated blank die sets, thus permitting the manufacturer to make his own dies.

"Standard" Extra Heavy Duty Buffing and Polishing Machine

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, announces an extra heavy duty (20 or 30 h.p.) buff-

ing and polishing machine, designed primarily for the hard production service required in producing automobile bumpers and also useful for other types of work such as kitchen utensils, agricultural implements, and so on.

Each side of machine is independent of the other, thus permitting one operator, if desired, to work at a speed differing from that of the other side of the machine. Or, when necessary, one spindle can be shut down without interfering with the operation of the other side. Each spindle has its own 10 or 15 h.p., 1,800 r.p.m. totally enclosed, fan cooled, ball bearing motor; magnetic starter; push-button station; hand brake for quickly stopping the spindle, and shaft lock for use in changing wheels. In addition, means are provided for adjusting the tension on the multiple V-belt drive.

Each spindle assembly is equipped with three oversize ball bearings protected in

BOYE & EMMES GEARED HEAD ENGINE LATHES 14" to 36"

Consider
This

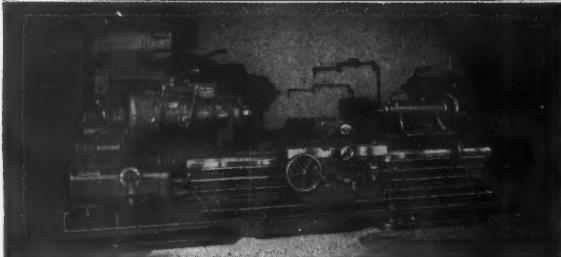
ALL GEARING IN THE LOWER HALF OF THE HEADSTOCK.

The headstock casting is of very heavy section, well ribbed. The back gears in front of headstock act as counterbalance for the spindle eliminating whipping action.

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Duluth... W. P. & R. S. Mars Co.

Grand Rapids... Joseph Monahan
Hartford... Pratt & Whitney Co.
Houston... Huge-Fayle Supply Co.
Los Angeles..... Jack Brewar
Melbourne, Fla.... William Rath
Milwaukee... Nichol Mch'y. Co.
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Write for bulletins

The BOYE & EMMES
MACHINE TOOL CO.

CINCINNATI 15, OHIO

STOP DUST WITH DUSTKOPS



Model 1150 DUSTKOP Dust Collector collects all the chips (note pile in back of DUSTKOP) from aluminum extrusion cut-off. Paddle wheel fan direct driven by continuous duty motor clears any size chip or shaving; cyclone separator for a first stage cleaning is followed by spun glass filtering of air before recirculating to work space.

DUSTKOPS require no duct work: Install in minutes.

New style, low cost, spun glass filter, is fire-safe, easy to shake down and seldom needs renewing.

Model 420 for small tool grinders, surface grinders, small wheel buffers, polishers, sanders, etc.



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Ask for complete information NOW on DUSTKOPS...
DUSTKOPS are LOW IN COST, EASY TO INSTALL, FULLY PORTABLE

liberal size oil reservoirs, with sight feed oil gage on each bearing housing. The diameter of the spindles between flanges is 2 inches, and the spindles have Acme threads and hard bronze nuts. The distance between wheel flanges is 9 inches, while the distance from the base to the inside of each wheel is 8 inches. The base measurement of the machine is 36 x 60 inches, and the net weight, 2,930 pounds.

Spindle speed is optional and for special applications, such as the production of farm implements, the distance from the floor to the center of each spindle can be 47 inches or some other suitable measurement. The machine illustrated measures 39 inches from the base to the center of each spindle.

Dayton Rogers Bellows Die Cushion

The Dayton Rogers Manufacturing Co., 2835 S. 12th Ave., Minneapolis 7, Minn., has developed a pneumatic die cushion of a "bellows" type design employing a molded synthetic rubber bellows which absorbs the die cushion travel of the hardened and ground pin

pressure pad. Constructed to withstand working pressures up to 300 p.s.i., the synthetic rubber bellows is said to be unaffected by oil in the air line, grease, or drawing compounds. Air leakage is claimed to be eliminated due to the balloon tire design.

In use, the die air jack is charged from the shop air line to a predetermined pressure that is recorded on a pressure gage which is furnished with each installation. Such pressure, it is stated, can be retained over the entire run of a given part with little or no loss in value.

The Dayton Rogers Bellows Die Cushion is made in sizes from 5 to 12 inches having drawing capacities up to 5 inches and can be used on all deep drawing jobs within its capacity, as well as for pressure pad control on a large percentage of forming dies, including ejector work, and so on. Off-center loading on the hardened and ground pin pressure pad is compensated for by a heavy duty pin pressure pad guide stem which also serves as an adjustable feature. In this manner, the operator can stop the pin pressure pad at a predetermined height, compensating for bolster plate thickness variation and the increase or decrease in length of the pressure pad pins. All ad-



MECHANIZE Hand Reaming with the CATSKILL Model R Power Reaming Machine

SPEED UP hand reaming to production line tempo! SAVE time, effort, money!

Compact, plug-in unit. Ideal for reaming, de-burring, lapping, chamfering, and special tool applications. A truly versatile power tool.

RANGE of SPEEDS
AVAILABLE

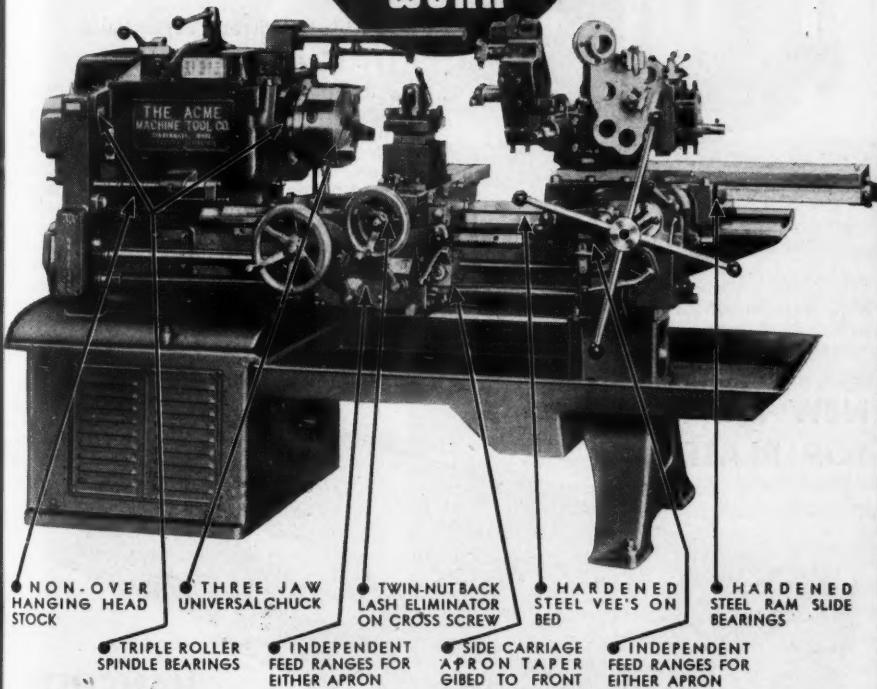
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CATSKILL METAL WORKS, INC.
CATSKILL, NEW YORK

MODERATELY PRICED

ACME Ram Type TURRET LATHE

for
accurate,
speedy - low cost
**CHUCKING
WORK**



NON-OVER
HANGING HEAD
STOCK

THREE JAW
UNIVERSAL CHUCK

TWIN-NUT BACK
LASH ELIMINATOR
ON CROSS SCREW

HARDENED
STEEL VEE'S ON
BED

HARDENED
STEEL RAM SLIDE
BEARINGS

TRIPLE ROLLER
SPINDLE BEARINGS

INDEPENDENT
FEED RANGES FOR
EITHER APRON

SIDE CARRIAGE
APRON TAPER
GIBED TO FRONT
BEARING ON BED

INDEPENDENT
FEED RANGES FOR
EITHER APRON

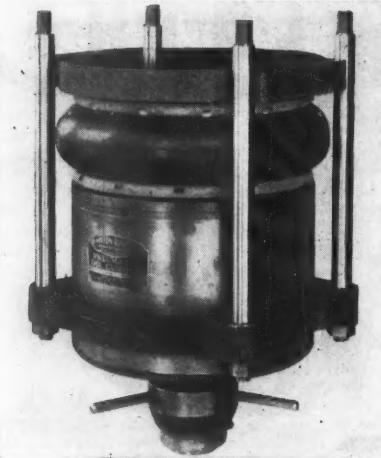
This ACME Ram Type Turret Lathe as illustrated is tooled for chucking work. It is also equipped with chasing attachment for cutting from 4 to 32 threads per inch. This attachment is extra and furnished only when required.

This type machine when fitted with automatic chuck and power screw bar feed will accommodate round bar stock up to 2" on the No. 5R machine and up to 2 1/2" round stock on the No. 6R machine.

All of the most important features necessary to maintain accuracy and speed at low cost are incorporated in this design.

For further information contact our engineering department. Write for Bulletin G107A.

ACME MACHINE TOOL Co.
CINCINNATI 32, OHIO



Dayton Rogers Bellows Die Cushion

justments are maintained by the adjustable handwheel on the end of the pin pressure pad guide stem, the handwheel being provided with a locking means to

maintain adjustments with the die cushion in constant working position.

The Dayton Rogers Bellows Die Cushion can be readily fastened to the bolster plate of the average press by the four suspension rods and is also designed so that a supporting structure can be furnished, thus making it possible to fasten the suspension rods to the press bed and allowing the bolster plate to be removed without removing the die cushion unit.

Dayton Rogers Hydraulic Overload Pitman

To eliminate the overloading of the average punch press in sizes from 30 tons and up, the Dayton Rogers Manufacturing Co., 2835 S. 12th Ave., Minneapolis 7, Minn., has brought out a hydraulic overload pitman which, it is claimed, not only prevents bending of the crankshaft and throwing other strains on the frame of the press, but also can be arranged to guard against severe overloading of the dies used in the punch press. The device is usually set to protect the maximum rated tonnage of the press, however, it may also be adjusted to protect any

NEW LAMINATED TOP PLATE



HANCHETT MAGNETIC CHUCK

GIVES 22% MORE CAPACITY

Uniform, firm holding of even smallest pieces . . . less slip-page . . . more production per hour.

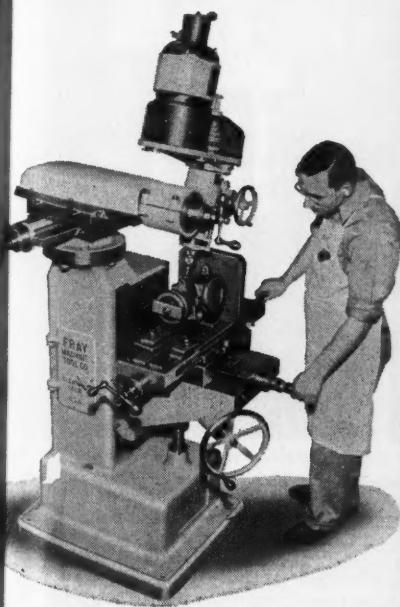
Get full details in Bulletin 044-MMD.

MADE IN ALL STANDARD SIZES.

HANCHETT MANUFACTURING CO., Big Rapids, Michigan

ONLY ONE WORK SET-UP for all operations with

Fray RAM TYPE No. 7-B
UNIVERSAL MILLING MACHINES



The 10" cross movement of the ram above the work, as well as the 12" transverse movement of the ram, combined with the 360 deg. rotation of the turret head—give a range of operations with one work set-up that is not possible with any other milling machine.

In addition to the controlled movement of the ram and turret, the "All-Angle" milling head can be rotated 360 deg. in horizontal or vertical planes, so that the head can be instantly set to any angle or compound angle.

For positive and accurate travel, ball cranks mounted on feed screws carry 3" dials and are calibrated in one-thousandths. The table working surface measures 7 1/2" x 29", and has a cross feed travel of 7". Table stops calibrated in one-thousandths. These are precision tools in every sense of the word—designed by toolmakers for use by toolmakers. Write for descriptive literature.

FRAY MACHINE TOOL CO.

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**SEND FOR YOUR COPY OF THIS
HANDY REFERENCE BOOKLET**

128 Pages on
CUTTING TOOLS
Drills, Taps, Dies,
Milling Cutters,
Files, Counter-
bores,
Allen Screws,
Groundstock,
Tool Bits, Etc.



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EASTERN TOOL SUPPLY CO.

"Tools of Distinction"

**176 GRAND STREET
NEW YORK 13, NEW YORK**

PEERLESS ABRASIVE BELT SURFACER

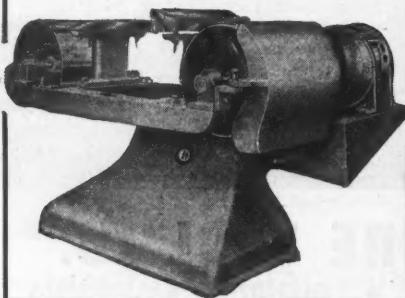
Speed and quality in grinding flat surfaces of metal, wood, hard rubber, celluloid and plastics.
Obtainable in both vertical and horizontal types—9", 14", 20" sizes.

Send for illustrated pamphlet.

PRODUCTION

MACHINE CO.

Greenfield,
Mass.



given tooling that is considered to need the necessary minimum protection.

The overload valve of the unit may be adjusted to any desired pressure and sealed to avoid tampering. The ram of the press is adjusted by the ram adjusting screw in the conventional manner. Before the press is started, however, the cushion pressure in the pressure chamber is brought to the desired pressure on the pressure gage by means of a hand

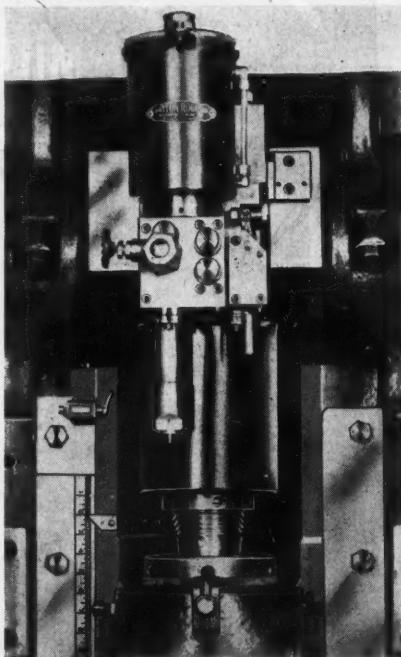


Illustration showing manner in which Dayton Rogers Hydraulic Overload Pitman is installed on punch press

actuator. The press is then started and the pressure in the pressure chamber is automatically maintained by a pumping mechanism which is actuated by a cam attached to the throw of the press.

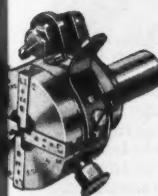
Should the press become overloaded during the work cycle, a piston retreats against the high pressure chamber and the increased pressure thus caused permits the oil to escape through the overload valve and into a reservoir. This action automatically provides for a re-

CHASO Builds New Insert DIE HEAD

Style D



Style DS



Chaso CSI Die Head
For Insert Chasers



Fixture for Grinding Tapped Chasers



CHASO, the largest independent manufacturer of Chasers and Die Heads. Not just experience during the war - 26 years experience; 16 years in the manufacture of chasers alone - 10 years in manufacture of Die Heads. Place your orders for Chasers and Die Heads at one stop. CHASO carries a large stock of standard Chasers for immediate shipment. We also carry a large stock of Die Heads and Die Head Parts. CHASO Die Head and Chasers combined, assure you of accuracy and dependability. All parts of CHASO Die Heads are hardened and precision ground to assure accurate threads. Our delivery on special Chasers - one week. Emergency service on ground thread chasers - 24 hours. Not just a promise but an actual fact.

Remember its experience
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We manufacture all types of
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Quality and precision
can be built into
Chasers only by ex-
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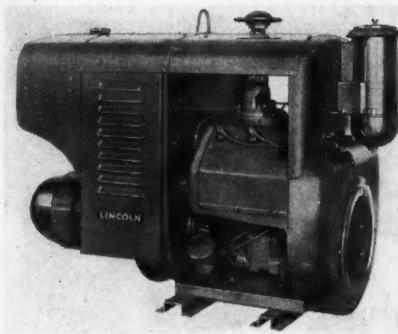
THE CHASO TOOL COMPANY, INC.
ROYAL OAK, MICHIGAN

duction in the pressure chamber and, therefore, the required pressure must be reestablished by the hand actuator before the press is ready to resume its operation. Once the working ram is set for a given tool, its position is said to remain constant at all times by means of the high pressure applied on the cylinder.

Lincoln "Shield-Arc, Jr." 200-Ampere Welder

A portable 200-ampere welder of the gasoline engine-driven type, to be known as the "Shield-Arc, Jr.," is announced by The Lincoln Electric Co., Cleveland 1, Ohio. Of particular value for welding applications in areas where electric power is not readily available, the welder is of unusually compact design, measuring 24 x 48 x 30 inches.

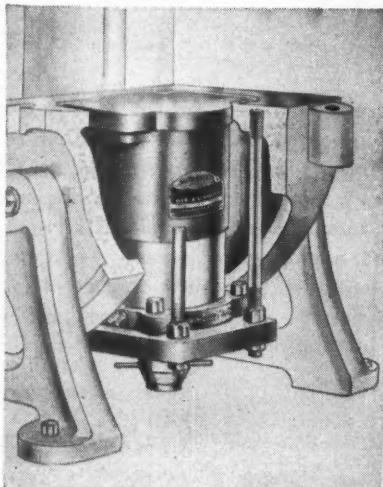
With a current range of from 40 to 250 amperes, the Shield-Arc, Jr., can be used for the welding of light or heavy cast iron structures such as engine blocks, for the construction of various contrivances or the repair or fabrication of tools and machinery parts, and for the hard facing of worn parts. Provision is made on the output panel for three ranges of output cur-



Lincoln "Shield-Arc, Jr." 200-Ampere Welder

rent, continuous adjustment within these three ranges being obtained by means of a simple speed control. Generator controls are mounted inside an enclosed cabinet above the generator, a cooling action being provided through a fan mounted on the generator shaft.

The welder is powered by a Wisconsin air-cooled four-cylinder V-type engine. Shrouds around the engine fan and cy-



A pneumatic Die Cushion for Every Punch Press Requirement

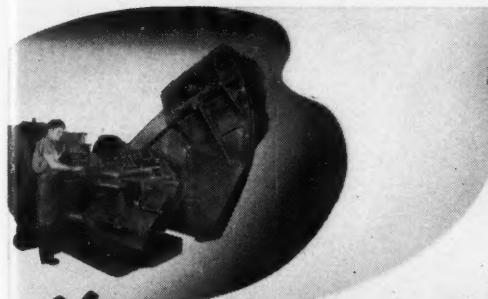
For deep drawing operations.

For pressure pad control on form dies.

For stripping blanks and ejecting slugs.

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Write for Engineering
Catalog No. 100-12.
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**DAYTON ROGERS
MANUFACTURING CO.**
Minneapolis 7, Minnesota



Allied
WITH MASS
PRODUCTION

More

THAN MACHINE
PRODUCTION
IS BEHIND

COLD FORGED PARTS

SUCH AS THESE



THE job of producing cold forged parts at Allied begins long before the work is on the machines.

Top quality cold forgings are manufactured at Allied to tolerances as close as are required on most machined parts, and possess strength and durability far greater than can be expected of parts made by other methods. In addition, parts of extremely unique forms are constantly being produced.

To meet requirements that are both exacting and unusual, Allied engineers and production men have developed many ingenious dies and fixtures. They have devised

methods which have reduced the number of operations ordinarily required to produce certain types of parts. It has been their intelligent planning which has resulted in parts which meet the customer's needs exactly and which reflect in cost the production economies which can be effected only by men who have had many years of experience in cold forging work. Let us show you how their abilities can be put to work for you.

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DEPARTMENT 4-A

4624 LAWTON AVENUE
DETROIT 8, MICHIGAN



COLD FORGED PARTS • STANDARD CAP SCREWS • HARDENED AND
GROUND PARTS • SHEET METAL DIES FROM THE LARGEST TO
THE SMALLEST • JIGS • FIXTURES • STEAM-HEATED PLASTIC MOLDS • SPECIAL
MANUFACTURED TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

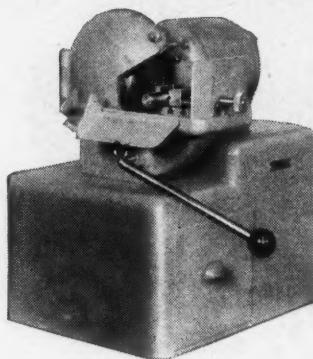
linders direct the cooling air. The speed of the engine determines the welding current which is controlled by adjusting the engine speed between a maximum of 2,100 r.p.m. (22 h.p.) and 1,500 r.p.m. (16 h.p.). Equipped with a 6-gallon capacity gasoline tank, the unit will operate under normal welding conditions for approximately 6 hours before refueling is required, it is claimed.

The complete unit is protected from falling objects by a canopy or shroud which also affords protection from the weather. Two transverse mounting rails designed for bolting to a floor or platform permit the welder to be mounted on either a shop trailer or high speed road type two-wheel trailer. The net weight of the welder is 660 lb. and the shipping weight is 705 pounds.

Buehler Model No. 1015 Abrasive Cut-Off Machine

Designated as the Model No. 1015, a 1 h.p. abrasive cut-off machine for cutting metal stock up to 1 inch in diameter is now being manufactured by Buehler Ltd., 165 W. Wacker Drive, Chicago 1.

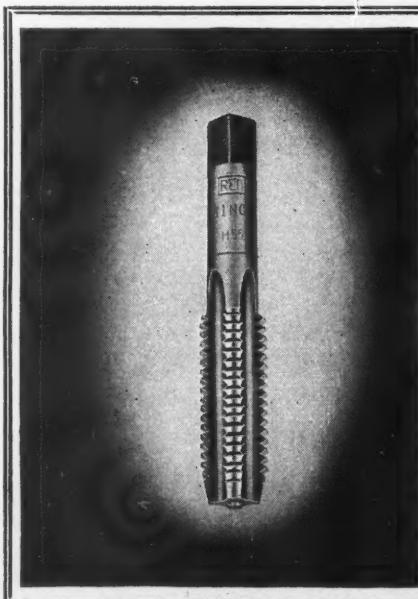
Ill. The machine is designed for table mounting, with a small amount of space being occupied. Coolant is supplied by



Buehler Model No. 1015 Abrasive Cut-Off Machine

a recirculating tank which is placed on the floor, with hose connections to the cutter.

While designed primarily for the met-



Specify Reiff & Nestor Ground Thread Taps for your production jobs.

They are ground from the solid 18-4-1 steel after hardening and toughening.

We will leave the choice to your considered judgment after you give R & N a try.

Performance will decide.

REIFF & NESTOR COMPANY

Makers of Fine Tools for
Thirty-Five Years

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UNITED STATES
ELECTRICAL TOOLS
assure economy
in operation



LITHE of line as a greyhound . . . and as speedy . . . sweet running . . . long-lasting . . . without unnecessary parts to cause extra maintenance or replacement costs . . . ruggedly strong for unhesitating and unvarying performance.



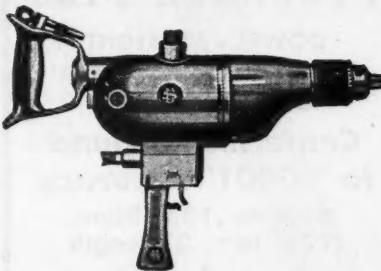
REGULAR AND HEAVY DUTY DRILLS

Model 14RG $\frac{1}{4}$ " Regular

Ball bearing throughout. Quick make and break trigger switch.

Model 14HD $\frac{1}{4}$ " Heavy Duty

Ball bearing throughout. Double pole trigger switch, automatic release, thumb latch.



HEAVY DUTY DRILLS

Model 58HD $\frac{5}{8}$ "

Model 34HD $\frac{3}{4}$ "

Super-powered, especially designed for heavy production work or maintenance. Ball bearings on armature. Chuck spindle mounted in two radial thrust ball bearings. Chrome nickel steel gears, heat treated, packed in grease and sealed. Two pole quick make and break trigger switch. Momentary switch, if desired.

Model 34HD can be furnished with No. 2 or 3 Morse Taper Socket without additional charge.

The UNITED STATES ELECTRICAL TOOL Co.
CINCINNATI, OHIO

allurgical laboratory, the Buehler Model No. 1015 Abrasive Cut-Off Machine is also said to be adaptable to general industrial use where precision and accuracy are required in abrasive cutting.

Aro Model 7000 Midget Pneumatic Screw Driver

The addition of a midget pneumatic screw driver to its line of pneumatic production tools is announced by The Aro Equipment Corp., Bryan, Ohio. Design-

Small Precision Pins

DOWEL - STRAIGHT
COUNTERSUNK - TAPER

Made to Blueprint

Centerless Ground
to $\pm .0001$ " Accuracy

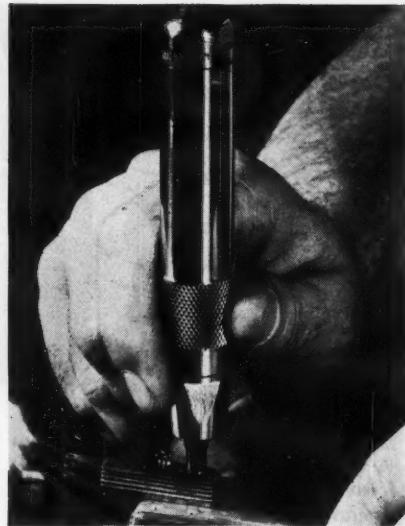
.030" to .125" Diam.
.125" to 2" Length

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Complete Centerless Service
Since 1931

3072

COMMERCIAL
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GRINDING CO.

6605 Cedar Ave., Phone: EN 3412, CLEVELAND 3, O.



Aro Model 7000 Midget Pneumatic Screw Driver

nated as the Model 7000, the tool, which is about the size and shape of the average cigar, is designed especially for driving small screws from No. 1 to No. 6. The tool weighs 8 oz. and is $4\frac{1}{2}$ inches long x $\frac{3}{4}$ inch in diameter.

The Aro Model 7000 Midget Pneumatic Screw Driver is fully automatic with no manual throttle. It is designed to start automatically when applied to the work and to adjust itself to every driving condition. The tool features a rotary type motor, four-blade construction, ball bearing throughout, and a hardened and ground steel rotor and cylinder. Chrome finished, it is also available with an

WHAT do your finely machined parts look like at the receiving end?

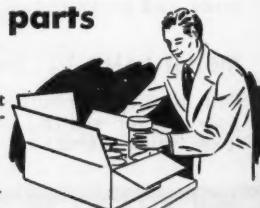
PROTECT fittings, exposed openings, threads, etc., in transit or storage, from rust or other spoilage. Use PRECISION safety guards. External, internal—close fit any shape.

Precision DUST CAPS & THREAD PROTECTORS

Tough fibre, spirally wound. Close tolerances. Won't slip off. Prompt delivery, any quantity. Write for folder.

PRECISION PAPER TUBE CO. 2051 West Charleston St.

Mfrs. of Dielectric Tubes, Bobbins, and Spools
Chicago 47, Ill.



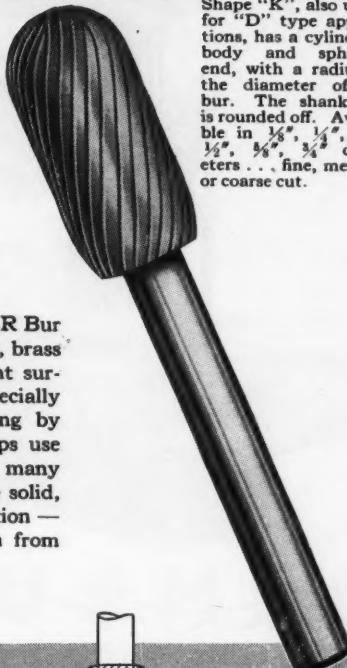
The Right BUR for the Job

RELY ON

Shape "K" BARREL

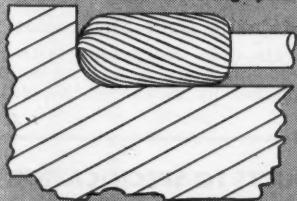
for clean work without
danger of scoring

The Pratt & Whitney Shape "K" KELLER Bur is popular in many aluminum, magnesium, brass and bronze foundries for finishing straight surfaces and irregular contours. Its specially radius-ground shank end prevents scoring by sharp cutting edges. Metal pattern shops use it widely for finishing fillets. All of the many P&W KELLER Burs are ground from the solid, *by machine*, to give you a smoother operation — longer life. Request further information from us on this and other KELLER burs.

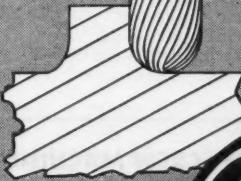


Shape "K", also useful for "D" type applications, has a cylindrical body and spherical end, with a radius $\frac{1}{2}$ the diameter of the bur. The shank end is rounded off. Available in $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ diameters . . . fine, medium or coarse cut.

No scored work with this rounded-off back on a straight surface finishing operation.

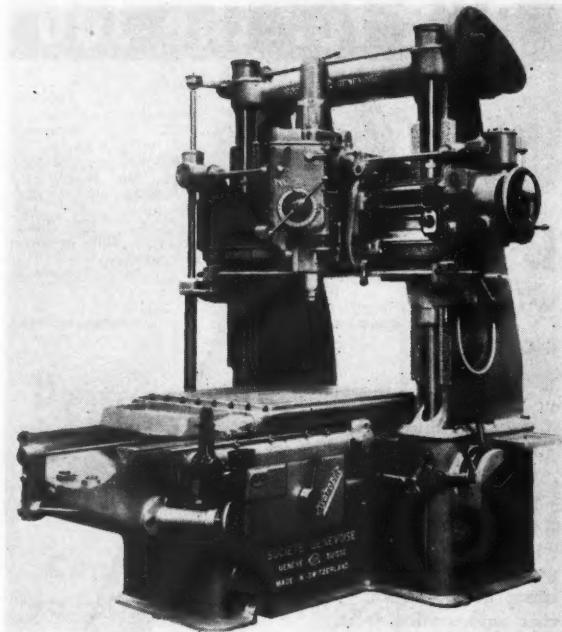


Finishing a fillet on a metal casting.



PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DEPARTMENT
WEST HARTFORD 1, CONN.

Hydroptic-B Jig Borer



adapter socket for nut setting. Finder and bits are easily interchanged for the various size screws.

Hydroptic-B Jig Borer

Developed by Societe Genevoise d'Instruments de Physique, Geneva, Switzerland, and now being marketed by the Cosa Corp., 5000-4 Chrysler Bldg., New York 17, N. Y., the Hydroptic-B Jig Borer illustrated herewith can, it is claimed, be

used for performing milling as well as boring operations with an equal degree of precision. The machine is equipped with an optical measuring system consisting of a standard scale of unusual precision and sighted by a micrometer microscope. According to the manufacturer this method of setting is ideal since it is not affected by any mechanical stresses, and an accuracy of 0.0002 inch is guaranteed for all settings of table and spindle.

The hydraulic table drive provides for rapid traverse of the table, as well as extensive and instantaneous feed variations. The controls for the table are so sensitive that after a few minutes of training, an inexperienced operator is able to stop the table within very close tolerances, it is claimed.

In addition to tool work, the machine can be used for machining component parts. A complete range of high precision accessories is available for the machine, including a precision circular dividing table and tilting rotary table.

Majestic Drill Sharpener

Accurate drill sharpening with inexperienced operators is said to be easily accomplished by means of the Majestic

PRODUCERS OF SCREW MACHINE PRODUCTS TO SPECIFICATIONS

We have:

ONE, FOUR and SIX spindle automatics maximum capacity $2\frac{5}{8}$ " round. Hand Screw Machines and Universal Turret Lathes maximum capacity 3" round. Castings and forgings machined maximum 10" diameter, 8" length, 15 pound weight. Secondary operation equipment for milling, drilling, tapping and assembling. Fabricators of aluminum, brass, steel and their alloys.

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Model
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There is no guesswork when you specify Gusher Coolant Pumps on your machines. You are assured of a coolant pump that is universally accepted by leading machine tool builders and designers.

If you want a pump that will cut costs and raise production in your metal cutting operations, specify the proven and original Ruthman Gusher Coolant Pump.

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M-B MODEL M-CR
75,000 R.P.M.



JUNIOR Pneumatic GRINDER

This model has been engineered for applications where a small rugged tool can be used advantageously. Steel body for safety. **Special grease-sealed bearings, requiring no automatic or manual lubrication.** Compound rotors develop an abundance of power. Extremely lightweight, 12 oz. Whole length 5 $\frac{3}{8}$; length of body 3". Accommodates mounted grinding wheels, rotary files, etc. on $\frac{1}{8}$ dia. shanks. Prompt deliveries.

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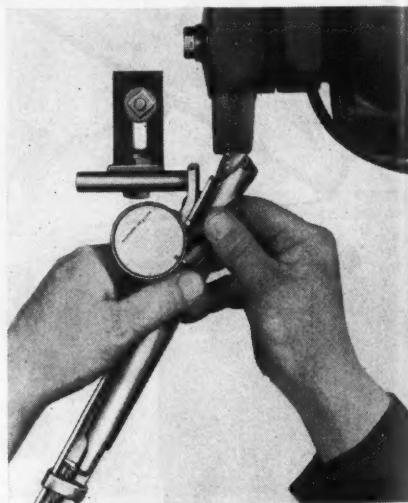


Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co.
DEPT. MS
TOLEDO 1, OHIO

Drill Sharpener now being manufactured by the Majestic Drill Sharpener Co., Dept. MMS, 1100 S. Second Ave., Minneapolis 2, Minn. By simply turning a calibrated dial, the sharpener is automatically set so that both cutting edges and both angles of the drill will be ground exactly alike, it is claimed.

The Majestic Drill Sharpener is designed to accommodate any size drill from $\frac{1}{8}$ to 1 inch with either straight or No. 2 taper shank, and can be easily



Majestic Drill Sharpener in Use

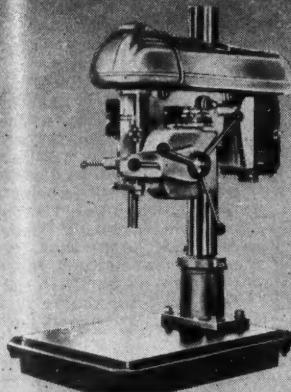
adjusted to sharpen drills for use in either hard or soft materials. The attachment is constructed to fit any tool grinder.

Roto-Finish 60-Inch Mechanical Finishing Machine

Announcement is made by the Sturgis Products Co., Sturgis, Mich., of a Roto-Finish 60-Inch Mechanical Finishing Machine which provides for the finishing and deburring of parts by a wet process. The machine may be obtained with from one to five compartments, thus permitting the processing of that many different sizes of parts simultaneously. A cam lock provided enables the operator to remove the door easily and quickly and to

260-5200

RPM



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SFM

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GET THE *Correct* CUTTING SPEED WITH WALKER-TURNER MACHINE TOOLS!



Every material — every operation — has its proper speed . . . the speed at which machining is done most accurately, most economically, most efficiently.

Walker-Turner Machine Tools — because of their exceptionally wide ranges of cutting speeds — enable production men to hit the correct speed "on the button"! This gives Walker-Turner Machine Tools versatility for handling all materials in all types of operations . . . from everyday production to complicated, special tooling set-ups. These qualities may prove the answer to your own problems. Write for our catalog today!

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Machine Tools Offer
These Advantages:

- Versatility.
- Rugged construction.
- Safe, simplified operation.
- Low power consumption.
- Low capital investment.
- Low operating and maintenance cost.

RADIAL DRILL — Drills to center of 62" circle. Head tilts 45° right or left. Maximum distance nose of chuck to table, 13½". Spindle traverse, 3¾". Chuck capacity, ½".

METAL-CUTTING BAND SAW — 14" and 16" models. Geared speed reducer. Table tilts to 45° and has mitre gauge groove. Blade tensioning device has spring cushion to absorb shocks.

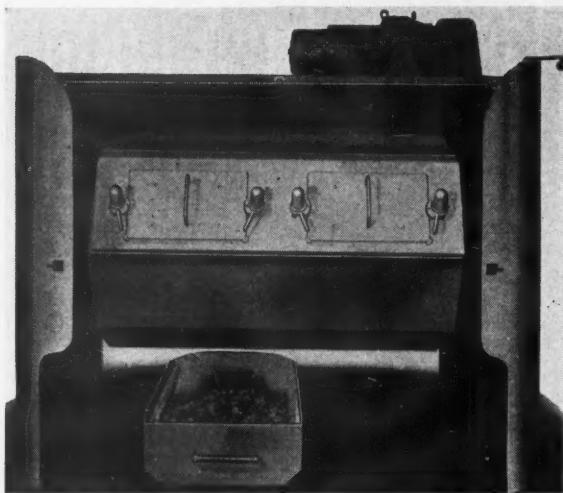
20-INCH DRILL PRESS — Hand or power feed. Bench or floor, single or multi-spindle models. Drills to center of 20" circle. Feed 6". Capacity 1" in cast iron, ¾" in steel.



MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

Roto-Finish 60-Inch Mechanical Finishing Machine



load and unload the machine in a minimum length of time. The door lock has a spring feature which permits any gases that might build up in the cylinder to escape. The lining of the octagonal cy-

linder is easily removable, thus permitting the speedy relining of the cylinder with hardwood.

The Roto-Finish 60-Inch Machine employs predetermined combinations of chips and compounds to finish and deburr workpieces at the same time. The action occurring in this process is a precision grinding operation that is said to leave parts with a bright, high color finish readily suitable for plating. Moreover, all parts thus finished are claimed to be uniform as to their surface, and all rough edges and sharp corners are

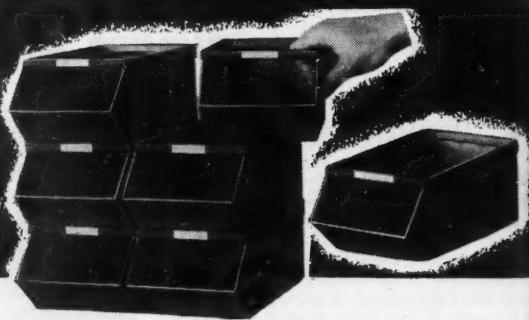
said to be removed.

According to the manufacturer, the Roto-Finish 6-Inch Machine is particularly adaptable to the production finishing of all types of hardware for automo-

5 to 23

Parts...

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You'll save time, space and labor handling parts and material when you use these patented STACKBINS. STACKBINS keep parts instantly accessible - eliminate waste

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hand motions - stack compactly to form units of exactly the right shape and capacity - make order filling or assembly work faster, easier, more efficient.

STACKBIN SYSTEM
"Stacked and Still Accessible"

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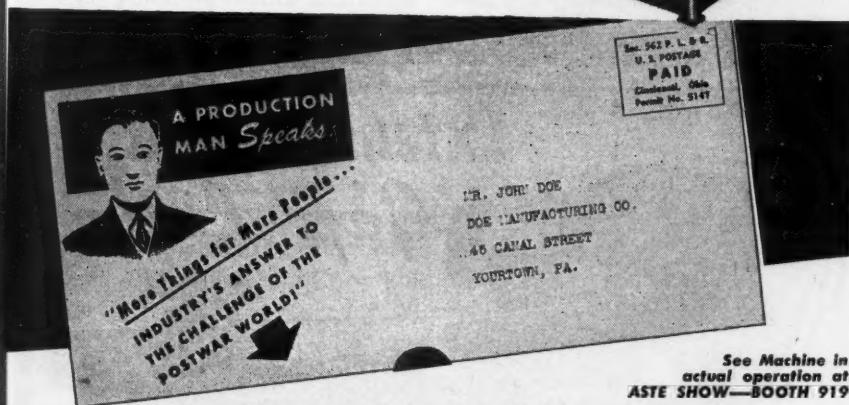
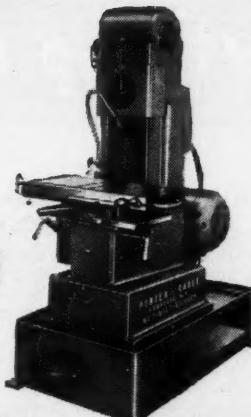
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Gentlemen: Please send me the actual photographic proof of your method. This request places me under no obligation.

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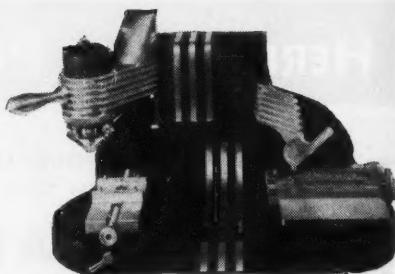
City _____ State _____

tive, plumbing, household, and other assemblies. In using the machine, the workpieces are placed in a wood-lined compartment of the barrel-shaped machine and selected chips and compounds are added. This mass generates as the barrel revolves, thus producing a grinding action which is controlled entirely by the type of chips and compounds employed, the barrel speed, and the length of time of the cycle. Optional equipment available to speed up production includes chip separators which can be obtained in either mechanical, magnetic, or manual types.

Auto-Engraver Model D-3 Engraving Machine

Arranged to engrave on an area of 4 x 4 inches, the Auto-Engraver Model D-3 Engraving Machine illustrated here-with, product of the Auto-Engraver Co., 1776 Broadway, New York 19, N. Y., can be used for engraving on flat or curved surfaces without special templates. It can also be used in drilling a multiple series of holes by employing a master plate.

The Auto-Engraver Model D-3 is designed to engrave numbers, letters, de-



Auto-Engraver Model D-3 Engraving Machine

signs, and emblems on iron, brass, copper, aluminum, soft steels, and all plastics, the depth of cut being easily regulated. Due to a minimum number of pantograph arms, backlash is said to be eliminated. Accuracy and increased production are achieved since both the article and type are visible at all times. Progress while engraving may be checked accurately by simply rotating the stylus arm without disturbing the work. The unit can be easily adjusted to accommodate different heights of work and the copy holder, being specially con-

Extension Bed Gap Lathes

Illustrated is the Series "AG" 20/40" Extension Bed Gap Lathe. Also made in 28/50" Heavy Duty.

The Extension Bed Gap Lathe is designed to be used either as a gap lathe or an engine lathe. We also manufacture a line of regular geared head engine lathes. Write for circulars.

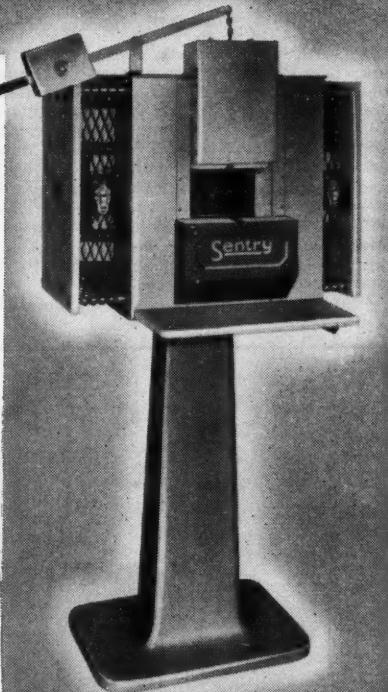
The Nebel Machine Tool Co.
CINCINNATI OHIO

correct hardness and uniform quality

WHEN tools, cutters and small parts are heat treated in Sentry Electric Furnaces with the aid of Sentry Diamond Blocks, you are assured of clean, scale-free, true-to-size work — and no decarburization. Sentry Furnaces are quick to bring to proper heat — no wasted fuel — no fumes.

Are most economical for volume production or tool room work. Sentry Diamond Blocks produce a uniform neutral atmosphere for scientifically heat treating Molybdenum, Tungsten and Cobalt high speed, or High Carbon High Chrome steels to obtain correct hardness and uniform quality.

Ask for Bulletin 1020-7E6



Sentry Model Y
Electric Furnace

Investigate Sentry Furnaces and
Sentry Diamond Blocks for cleaner,
faster hardening. Sizes and capacities
to meet your needs.



The Sentry Company
FOXBORO, MASS., U. S. A.



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I, 1946

structed, permits practically any type of setup.

The Auto-Engraver Model D-3 measures 21 inches long x 20 inches wide x 13 inches high, weighs 40 lb., and has a fixed ratio of 1 to 1. It is supplied complete with a universal 115-volt a.c.-d.c. motor; micrometer depth control; 2 high speed steel cutters; 2 copy holders; 6 x 8-inch copy table; 2 copy holder clamps; work table vise; and block letters and numerals $\frac{1}{8}$ inch high.

with completely open face, the Amic Quick-Action Vernier Caliper is made in both stainless and tool steels and is sup-



Amic Quick-Action Vernier Caliper

Amic Quick-Action Vernier Caliper

Inside diameters are said to be as quickly and directly measured in thousandths of an inch as are outside dimensions by means of Amic Quick-Action Vernier Caliper now being offered by the American Measuring Instruments Corp., 240 W. 40th St., New York 18, N. Y. Depth measurements up to 5 inches are recorded on the same direct-reading scale. Direct thread measurements may be obtained inasmuch as the beveled edges on the jaws of the tool permit them to be introduced into the thread.

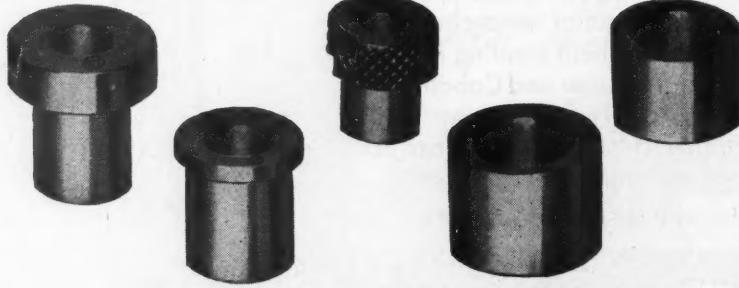
Featuring a one-piece sliding member

plied in an attractive tough leather case so that it may be conveniently carried in the craftsman's pocket.

Cleveland Model 400 Universal High-Pressure Hydraulic Die-Casting Machine

Complete elimination of cold metal from the shot furnace, improved hydraulic performance, automatic timing,

DRILL JIG BUSHINGS



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Watch them "On the Job"



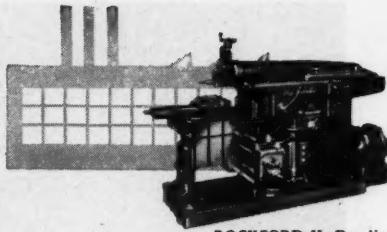
You'll Give These Machines

Top Rating

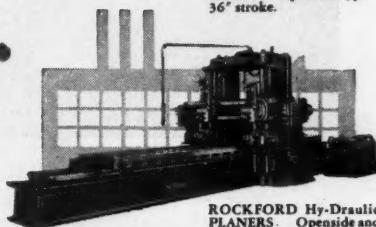
Making set-up work and operation easier results not only in faster work, but better work. These are two advantages that Rockford Hy-Draulic Machines provide. Operator fatigue, often the cause of slow work as well as spoiled work, is cut to a minimum.

If you'll watch these machines "on the job" and check specifications, you'll give them top rating. Unique in their field, Rockford Hy-Draulic Machines offer exclusive advantages that result directly from hydraulic drives and hydraulic feeds. Any cutting speed or feed as well as any cutting stroke length within the range of the machine is quickly and exactly obtained. Efficient, smooth cutting strokes result from hydraulic pressure that maintains an established cutting speed no matter how work resistances may vary. Stroke reversals are made instantaneously and without shock. Accuracy in operation is provided by Rockford design and high standards of construction.

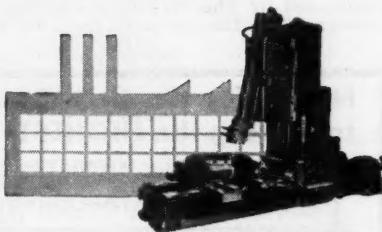
Complete information on Rockford Hy-Draulic Shapers, Planers, Slotters, and Shaper-Planers may be the beginning of better, lower-cost machining in your shop or plant. We invite your inquiry ask for Catalog 1631



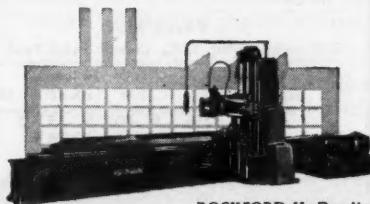
ROCKFORD Hy-Draulic
SHAPERS . . Ram type—
12", 16", 20", 24", and 28"
stroke . . Openside type—
36" stroke.



ROCKFORD Hy-Draulic
PLANERS . . Openside and
Double-Housing. Four sizes,
each available in maximum
stroke lengths of 10, 12, 14,
16, 18 or 20 feet.



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SLOTTERS . . 12", 20" and
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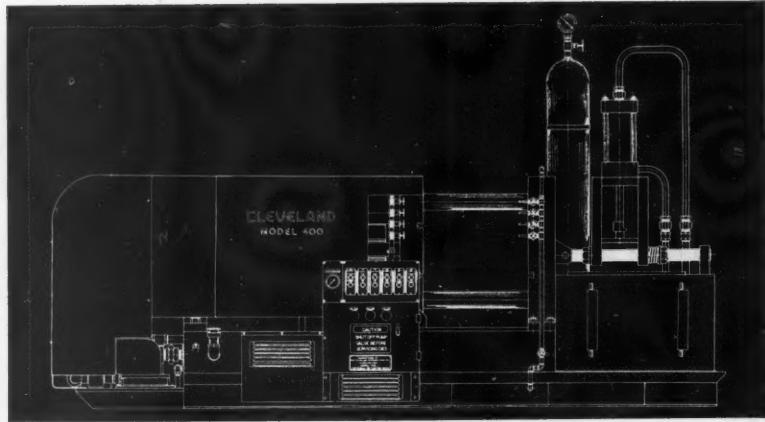


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Stroke lengths, sizes of 42",
66", 90", 120" and 144"

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Hy-Draulic

ROCKFORD MACHINE TOOL CO.
ROCKFORD, ILLINOIS



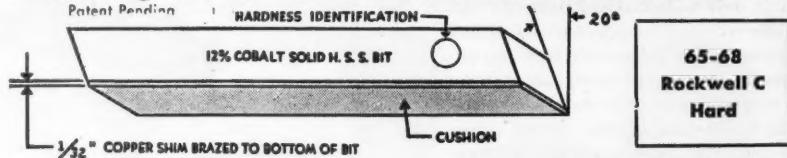
Cleveland Model 400 Universal High-Pressure Hydraulic Die-Casting Machine

and improved adjustable bearings for the movable platen are advantages and features claimed for a universal high-pressure hydraulic die-casting machine announced by The Cleveland Automatic Machine Co., 2269 Ashland Ave., Cleve-

land, Ohio. Designated as the Model 400, the machine is available for zinc, tin and lead casting or for magnesium, aluminum, bronze, or brass.

Featuring interchangeability of hot metal ends, the Model 400 incorporates a

Now—for the first time—a real GENERAL PURPOSE tool using the HIGHEST COBALT HIGH SPEED Steel . . .



PRICE LIST						
Cushioned Solid 12% Cobalt H.S.S. Tool Bits						
		In lots of				
Size of Bit		1-9	10-49	50+		
1/4	1/4	2 1/2	\$.60	\$.55	\$.50	
5/16	5/16	2 1/2	.80	.75	.70	
3/8	3/8	3	1.05	1.00	.95	
7/16	7/16	3 1/2	1.45	1.40	1.35	
1/2	1/2	4	2.00	1.95	1.90	
5/8	5/8	4 1/2	3.10	3.05	3.00	
3/4	3/4	5	4.60	4.50	4.40	
7/8	7/8	6	7.20	7.10	7.00	
1	1	7	10.20	10.10	10.00	

The "cushion" does it—you get the extreme Rockwell and RED HARDNESS of 12% Cobalt H.S.S., plus an EFFECTIVE TOUGHNESS heretofore unobtainable with High Speed Steel Tools.

Gives production increases of from 20% to 200% through increases in speed and feed.

Ideal for shaper and planer work and interrupted cuts.

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GUARANTEE: If not satisfied that this is the best GENERAL PURPOSE H.S.S. tool you have ever used—bits can be returned for full credit.

A TRIAL WILL CONVINCE YOU.

GENERAL TOOL & DIE COMPANY Inc.

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Phone: Orange 5-2500

East Orange, N. J.

**1 NEW
EFFICIENCY!**

**2 NEW
LONG LIFE!**

**3 NEW
ADAPTABILITY!**

You get all three with the New **SUPER**
SOLID CARBOLOY
INSERTED BLADE
MILLING CUTTER



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at the
A. S. T. E.
NEW ERA
EXPOSITION
CLEVELAND, OHIO
April 8-12

- **EFFICIENCY**—Mill any and all materials with one type body. Solid carbide blades can be quickly ground to any angle.

- **LONGER LIFE**—Body of Super design holds the wedged-in blade which can be adjusted for wear . . . assures profitable use.

- **ADAPTABILITY**—Easy to sharpen, the solid carbide blades can be ground to angles for all types of work.

SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

toggle and pump mechanism that is entirely enclosed in steel guards which are streamlined to provide for ease of maintenance and are removable to permit ready access to working parts. The zinc-tin-lead machine includes a double-compartment furnace with separate automatic burners for each compartment. New metal is placed in the second compartment, automatically causing the overflow of readied molten metal into the shot section. Even temperature and uniform condition of the shot metal are said to be maintained by this method.

According to the manufacturer, im-

proved uniformity in hydraulic performance is achieved by the addition of a heat-exchanger oil cooler. The water flow heat absorption is augmented by a fin construction of the outer shell which affords a high rate of heat radiation and provides a combination of air and water cooling. The constancy of hydraulic oil temperature thus attained improves the uniformity of hydraulic performance.

Automatic timing is included as a standard feature of the Model 400 and is combined with manual control so that the method of operation may be selected in accordance with the type of production involved. All controls are centered on a single panel close to the operating station.

Bronze adjustable wedge-type slide bearings are provided under the movable platen of the machine. These bearings, sliding on hardened steel base strips, carry the full weight of the platen, thus removing the strain from the tie-bars which act merely as rigid guides, with large-area bronze bearings located between the platen and the bars. This construction is said to strengthen the plate assembly and help to maintain accurate alignment of the die plates.

Rousselle PUNCH PRESSES



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4½ TON
CAPACITY

Write for Details.

The Service Machine Co.
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Reduce Production
Cost on small work,
or on jobs requiring
frequent setups.

Floor or bench mo-
dels.

Prompt Delivery.

Enco Hexturret

A bed turret for lathes up to 14-inch swing, to be known as the Hexturret, is announced by the Enco Manufacturing Co., Dept. 11, 4522-24 Fulton Ave., Chicago 39, Ill. The turret utilizes double steel drive gears and double raks for equalizing the feed of the tool on the work. This twin drive is also said to keep the turret in accurate alignment and minimize wear. Double heavy duty gibs are employed to maintain constant accuracy, providing for adjustment from either the front or back dovetail.

SAVE THOSE OLD TAPS. REGRIND THEM



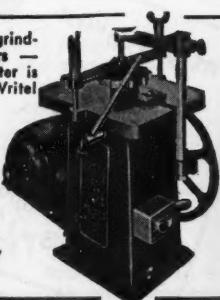
RESHARPEN
DULL TAPS.
PROMPT
DELIVERY.

Used on tool and cutter grinders — surface grinders — even bench lathes. Tap sharpened after center is destroyed. No collets. Complete. No extras. Write!

READING MACHINE COMPANY
READING (CINCINNATI), OHIO

BROACH KEYSEATER

The Reading Bench Machine does not require bushings or guides. Very fast capacity from $\frac{1}{8}$ to $\frac{1}{2}$ cutter. Low first cost.



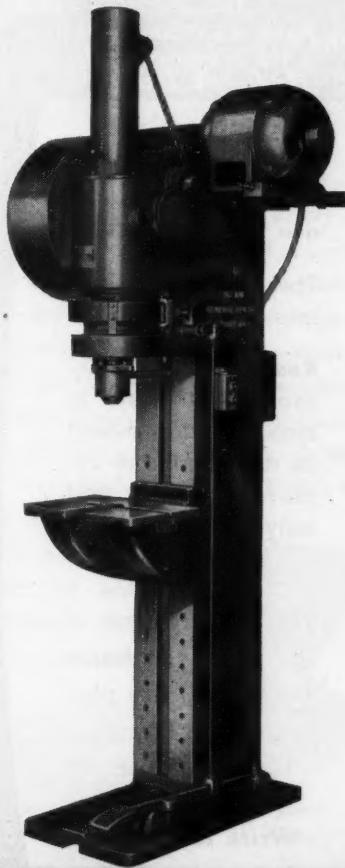
Write for Bulletin No. 381 On This New 15-Ton General Flexible Power Press

This is a new model—improved press. Write for Bulletin No. 381 describing it.

General Flexible Power Presses—capacities 5 tons to 60 tons have instantly flexible power.

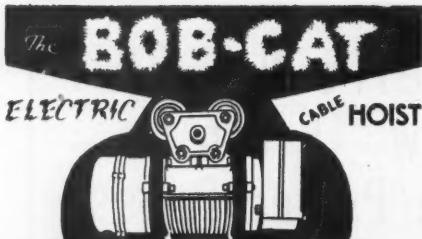
They give you as little or as much power as you need by simply "stepping" very lightly or a little heavier on the Foot Control Pedal. • How EASY this makes the job of STRAIGHTENING parts after heat treating or before machining. • Inexperienced operators can quickly learn to keep ahead of production requirements.

• FLEXIBLE POWER Presses are also being used in production for Push Broaching, Assembling, and many other Pressing Operations.



GENERAL MANUFACTURING CO.,
6438 Farnsworth Ave., Detroit 11, Mich.

GENERAL *Flexible*
POWER PRESS



*Any Part Can be gotten at
with removal of
Only 4 Bolts*

**Each of the three
vital working parts
are built in units.**

These units fit rigidly
into a solid frame.

Result: At any time,
should you want to
make an adjustment
in any part, the re-
moval of that **unit**
only (4 bolts) will do
the trick.

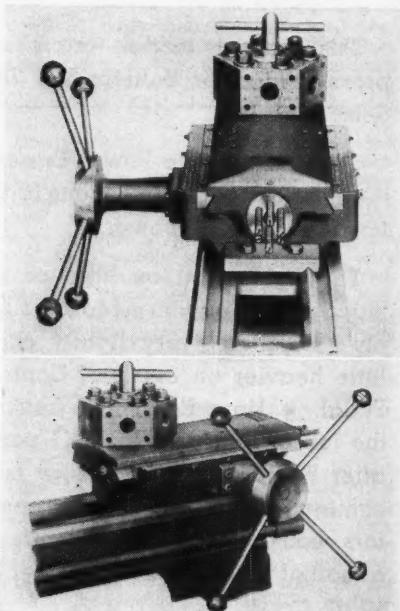
*This is only One of
the many Exclusive
Features of this phe-
nomenal Electric
Cable Hoist.*

**Write for all the
interesting facts.**

LISBON HOIST & CRANE COMPANY
PIONEERS OF BETTER HOISTS. LIFTING AND CONVEYING EQUIPMENT
DIVISION OF THE WEIGHT FILE CO.
LISBON, OHIO

All bearing surfaces of the Enco Hex-turret are hand scraped, spotted and fitted to assure proper and long trouble-free use. All parts of the indexing mechanisms are hardened. Extreme precision of indexing is claimed to be obtained through the use of hardened and ground tapered bushings in the turret head and hardened and ground tapered index pin and pin sleeve.

According to the manufacturer, un-



End and Side Views of Enco Hexturret

usual versatility of the turret is provided for by the hexagon-shaped turret head which allows for the mounting of flanged tools and toolholders. Additional features of the turret include clearance of the lathe saddle wing for work close to the headstock, a safety clamp to prevent "crawling" of the turret, and hardened stop screws.

Parlec Home Workshop Tool

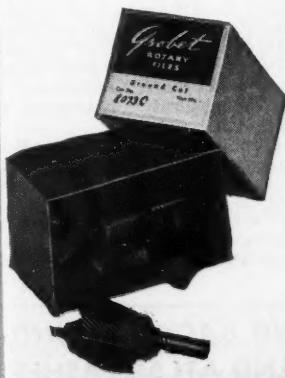
A combination power tool for home workshops, modelmakers, and light manufacturing has been announced by the Parlec Tool Co., 919 E. Redondo Blvd.,

A NEW

Grobet

SHIPPING FEATURE

*Smallest Shipments
Now Fully Protected
Until Used.*



A special tough adhesive paper is now used for wrapping each and every Grobet Rotary File in orders too small to ship in special all-purpose storage boxes.* This wrapping assures that the files will arrive in perfect condition—sealed against scratching—sealed against the elements.

This special Grobet wrapping, a long desired protection for "loose" shipments and small stock handling is another reason for buying GROBET ... "The Complete Line" of Rotary Files in Mill Cut, Ground Cut and

Hand Cut for work on hard and soft metals, wood, rubber, plastic.

Send for Catalog R.

All purpose shipping
container for order of
from 50 to 100 Grobet



GROBET FILE CO. of AMERICA

421 Canal Street

IMPORTERS OF GROBET SWISS FILES

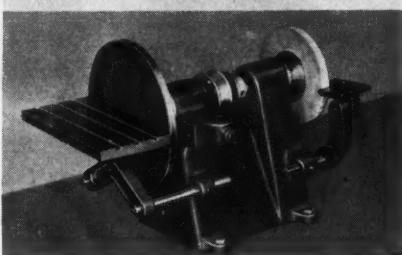
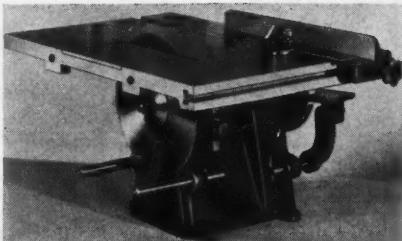


New York, N. Y.

MFRS. OF GROBET ROTARY FILES

Inglewood, Calif. The basic tool includes a grinding wheel on one end and a sanding disc with adjustable work rest on the other end. Either the grinding wheel or the sanding disc may be replaced with buffing or polishing wheels for a second combination.

By simply loosening two set screws and detaching the work rest used with the sanding disc, then lifting off the sanding table, replacing the sanding disc with an 8-inch saw blade, and setting another table in place, a third adaptation of the tool is provided. Adjustment for height of the table is made by means of the set



Parlec Home Workshop Tool

BRADFORD METALMASTER LATHES

14½" - 16½" - 18½" Swing

TOOLROOM AND ENGINE TYPES

... Also ...

CAM FEED

UNIT TYPE

DRILLING AND
TAPPING
MACHINES



1840 - 1945

The Bradford Machine Tool Co.

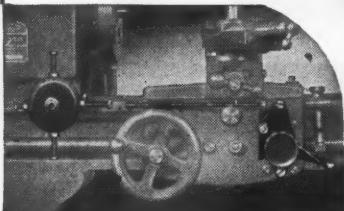
Evans at 8th St.

Cincinnati 4, Ohio

screws used in attaching the table to the frame of the tool. The saw table can be tilted a full 45 degrees for irregular cutting. A calibrated work guide provided is said to eliminate guesswork in making angular cuts and an adjustable guide located at one edge of the table is said to assure accurate parallel cutting. The parallel work guide slides in a T-slot provided the full width of the table.

A fourth combination of the Parlec Home Workshop Tool is afforded in the unique design of the saw table which permits dado heads to be employed for routing, and so on. A movable plate incorporated in the table is slid away from the cutter, a fixture is attached to the table edge

50% TIME SAVING BY ELIMINATING BACK GEARING ON LOGAN AND ATLAS LATHES



By allowing tool to cut relief in work on last turn of thread, instead of disengaging half-nuts and simultaneously withdrawing tool, all threads, long or short, from 4 to 224 per inch may now be cut without back gearing.

Fast . . . Safe . . . Accurate . . . \$22.50

INDEPENDENT SPECIALTIES

152 W. 75TH ST.

CHICAGO 21, ILL.

Save Taps...

Use This New Procunier Tapping Head With the Exclusive TRU-GRIP Tap Holder

Here is a precision tapping head with a tap holder that really saves taps. The new TRU-GRIP tap holder is lighter, smaller and more accurate than conventional tap holders. The flattened surfaces of the spring tap collet fit into a broached section of the chuck while the tap has a positive drive through the square hole broached in the collet. Thus the tap is held in true alignment by the round of its shank and driven by the squared portion which fits into the collet. Tapping is done faster and with greater accuracy. Tap shanks are never scored or disfigured, tap damage is kept to a minimum.

The TRU-GRIP Holder is only one of the many exclusive features of Procunier Tapping Heads . . . the double-faced cork clutch, the planetary gear reversing mechanism, the ball bearing mountings all assure greater tapping accuracy at high speeds with automatic protection for taps.

Send coupon today for circular giving complete details, specifications and prices.

Mail Coupon Today

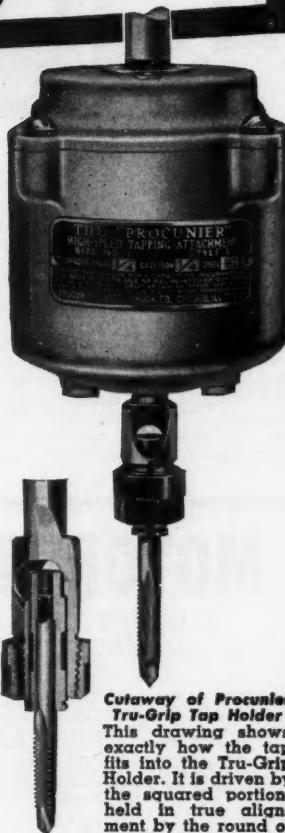
**PROCUNIER SAFETY CHUCK CO.,
12 S. Clinton St., Chicago 3, Ill.**

Send me bulletins on: Procunier High Speed Tapping Heads Procunier Tru-Grip Tap Holders Universal Tapping Machines.

Name

Address

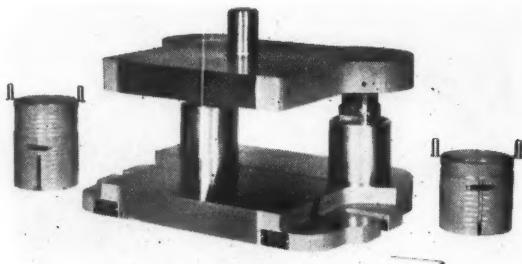
City State



**Cutaway of Procunier
Tru-Grip Tap Holder**
This drawing shows
exactly how the tap
fits into the Tru-Grip
Holder. It is driven by
the squared portion,
held in true alignment,
by the round of
the shank.

PROCUNIER SAFETY CHUCK CO.

12 S. Clinton St.
CHICAGO, ILL.



Lempco Roller Bearing Type
Precision Anti-Friction Die Set

Lempco Anti-Friction Die Set

In order to operate the Lempco Punch Press at the extremely high speeds of which it is capable, Lempco Products, Inc., 5717 Dunham Rd., Bedford, Ohio, has devised a die set with guide pins which, it is claimed, will not "freeze" as a

result of the friction developed at these very high speeds. The die set is available with two types of guide pins; namely, a round pin style employing ball bearings and a square pin type utilizing roller bearings. According to the manufacturer, a preload of 0.0015 inch is set up in both the round and square pin models. (Test runs of 18 million strokes made under more difficult than normal conditions showed that a 0.0005-inch preload remained, the manufacturer states.)

Designed for easy opening and closing by hand, the Lempco Anti-Friction Die Set is precision made to rigid standards of accuracy. Guide pin holes are located

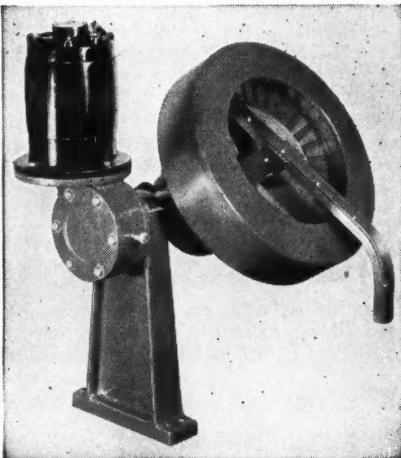
MOTORIZED HOPPER UNITS

ADAPTABLE TO ANY
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FEED BULLET CORES,
SCREWS, PINS, WASHERS,
BEARING ROLLERS, NUTS,
RIVET, SPECIAL PARTS.

Send Samples for
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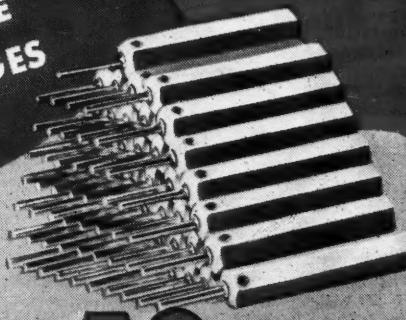
DETROIT POWER
SCREWDRIVER CO.
2807 West Fort St.
DETROIT 16 • MICHIGAN



ANNOUNCING

Van Keuren

CARBOLOY
WIRE TYPE
PLUG GAGES



1 VAN KEUREN CARBOLOY GAGE = 50 TOOL STEEL GAGES

Wire type plug gages were originated by The Van Keuren Co., in 1925 and are now recognized as the most economical gages for measuring small holes.

The original wire type plug gages were made of tool steel. The use of high speed steel doubled gage life; precision chrome plate gave five times the life, and now gages of carbolyte are available with fifty times the life of tool steel. All of these materials are still in use and have their particular applications and advantages.

VK Catalog gages are made in sizes from .020" diameter to .250" diameter. They are available only in the wire type designs as this is by far the most economical small plug gage. In cases where it is desired to use Van Keuren Carboly wire type Go units with existing No Go units of the taper insert design, special handles can be furnished for this purpose. Van Keuren wire type plug gages assure longer lasting pre-

cision and lower gage cost because the entire 2" length of gage unit can be used. When the end becomes worn it is ground off and a new section of the original accuracy is moved out for use. The wire type unit is securely held in the handle by a split bushing and a headless set screw.

VK Carboly wire type plug gages are made to Class B accuracy, plus .00005" minus .00000" on the Go unit and plus or minus .000025" on the No Go unit. Closer or wider tolerances can be supplied if desired.

On your next order specify VK wire type plug gages. VK Carboly for long runs because of the enormous saving in gage cost. VK Carboly for fussy jobs because of the infinitesimal gage wear and insurance that the parts will be within the specified limits. VK Tool Steel—High Speed—Precision Chromium for less exacting jobs. You will be assured of the best in accuracy, quality and delivery.



Write for your copy of catalog and handbook No. 33. It contains complete information on Van Keuren precision gages and instruments and valuable engineering formulas and data on measuring problems.

Write for circular C 35 on Carboly wire type plug gages, Thread measuring wires and Gear wires.

THE *Van Keuren*
CO., 176 WALTHAM ST., WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carbolyte Plug Gages • Carbolyte Measuring Wires.

Chrome Bore Gage in Use

and bored on jig boring machines. The punch holder and die holder are matched, clamped, and bored in the same operation so as to provide for commercially perfect alignment. The guide pins themselves are made of specially formulated wear-resisting alloy steel and are hardened and ground to extremely close tolerances. All flat contact areas are precision ground to unusually fine finishes on surface grinders and are inspected and checked until commercially perfect.

Chrome Bore Gage

An electronic bore gage utilizing direct contact for measuring the diameters of tubes, guns, and other cylindrical interiors with an accuracy of one-half of ten thousandths of an inch is now being



introduced by the Chrome Gauge Corp., Philadelphia, Pennsylvania.

The gage, comprising a projection rod mounted on a stabilized frame and containing a delicate, flexible point, is inserted into the bore where it checks by contact all interior surfaces. The results of the test are transmitted instantaneously to a Brown ElectroniK precision indicator. This instrument, featur-

BUTTERFIELD TAPS

You can always rely on BUTTERFIELD TAPS to give the best possible results at the lowest expense. BUTTERFIELD TAPS can be supplied in four different grades as follows: 1. Carbon Steel Cut-Thread Taps. 2. High-Speed Steel Cut Thread Taps. 3. High-Speed Steel Commercial Ground Thread Taps. 4. High-Speed Steel Precision Ground Thread Taps.

UNION TWIST DRILL CO. BUTTERFIELD DIVISION

Factories: DERBY LINE, VERMONT, U. S. A.
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

Stores:

Cleveland 3346 Superior Ave.
Chicago 11 S. Clinton St.
Detroit 5527 Woodward Ave.
New York 61 Reade St.





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SEVERAL THOUSAND REID PRECISION GRINDER USERS IN NEARLY EVERY COUNTRY VOUCH FOR THEIR CONSTANT PRECISION RESULTS. THERE ARE REID GRINDERS IN OPERATION CONVENIENT TO YOUR LOCATION.
(ADDRESSES ON REQUEST)

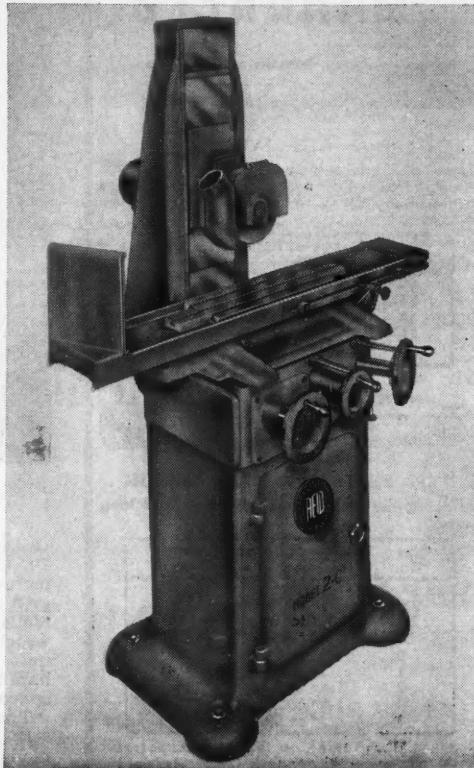
ILLUSTRATED IS MODEL 2-C REID HAND-FEED SURFACE GRINDER.

HIGHLY RECOMMENDED FOR CLOSE TOOL, GAGE, DIE AND CERTAIN PRODUCTION GRINDING.

EXCELLENT DELIVERIES

DISTRIBUTORS CONVENIENTLY LOCATED IN ALL SECTIONS.

Write Dept. "E"
For Illustrated
Bulletin



Reid Brothers Company, Inc.
BEVERLY MASSACHUSETTS

PROMOTE ↪ Production and Precision with **NICHOLSON** *Expanding* **MANDRELS**



TYPE A—STEP JAW DESIGN

Especialy adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Length Overall
1A	1/2" to 1"	9"
2A	1" to 1 1/2"	11"
3A	1 1/2" to 2"	12 1/4"
4A	2" to 3"	20 1/4"
5A	3" to 4"	21"



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Length Overall
1X	1/2" to 7/8"	5"
2X	7/8" to 21/32"	6"
3X	21/32" to 9/16"	6"
.00	9/16" to 7/8"	8 1/4"
0	7/8" to 1"	8 1/4"
1	1" to 1 1/4"	9"
2	1 1/4" to 1 1/8"	11 1/4"
3	1 1/8" to 2"	13 1/4"
4	2" to 2 1/2"	17 1/4"

Other sizes taking up to 7" bores. Set of 19 Nicholson expanding mandrels does work of 209 solid arbors. Sold singly or in sets. Bulletin 1043.

W. H. NICHOLSON & CO.
136 OREGON ST., WILKES-BARRE, PA.

ing continuous balance, picks up and indicates various imperfections, air pockets, and other unwanted conditions to 0.00005 inch.

Ideal "Air-Horse" Riveting Hammer

Known as the "Air-Horse," a pneumatic riveting hammer featuring small size, lightweight, and rugged construction is announced by the Ideal Commutator



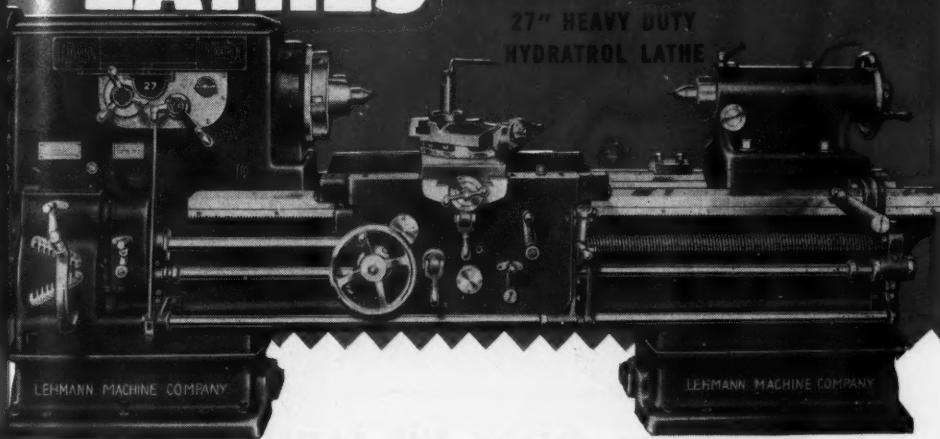
Ideal "Air-Horse" Riveting Hammer

Dresser Co., 1031 Park Ave., Sycamore, Ill. Other features claimed for the unit include excellent balance, hand-fitting grip design, ease of operation, and controllable speeds. The expansion of air which is exhausted from the front of the unit at the operating head enables the hammer to operate coolly even at high speeds, it is claimed.

The barrel is of one-piece all-steel construction with a reinforced end to accommodate piston impact without breaking. The piston is made of hardened alloy steel for long and heavy service. The valve block and sleeve valve are made with large wearing surfaces to provide for long tool life and minimum maintenance.

An air-throttling regulator valve in-

Check these 7 Features of **HYDRATROL LATHES**



27" HEAVY DUTY
HYDRATROL LATHE

Features of Superiority

Hydraulically-operated Speed Changes.

Simplicity in Construction; Simplicity and Safety in Operation.

Automatic Slide Rule indicates spindle speeds, operation numbers, cutting speed.

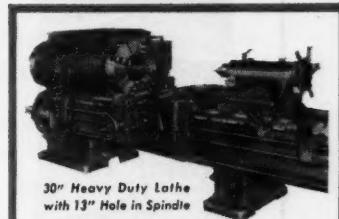
Hydraulic Friction Clutches and Hydraulic Brakes, self-compensating.

Automatic Safety Relay, for harmless and easy engagement of positive clutches when speeds are changed.

Spindle Release for Chucking.

Perfect, Safety-Control Lubrication with Filtered Oil.

Send prints for a time-and-money-saving recommendation.



30" Heavy Duty Lathe
with 13" Hole in Spindle

LARGE HOLLOW SPINDLE TYPE 5 SIZES—18" to 36"

Small.....	18"	up to	7½"	Hole
Medium.....	24"	up to	12"	Hole
Large.....	27"	up to	13"	Hole
Large.....	30"	up to	14"	Hole
Large.....	36"	up to	16½"	Hole

(Standard type lathes, 16" to 36")

LEHMANN MACHINE COMPANY, ST. LOUIS 3, MISSOURI

HYDRATROL LATHES

cluded with the Air-Horse permits very fine adjustment of the hammer speed for all kinds of riveting, even on plain or heat-treated alloy aluminum, brass, or soft iron. When used with the proper tool, the Air-Horse is also said to be suitable for caulking, scaling, chipping, and other work. A beehive retainer spring is easily screwed onto the unit with the fingers.

The Hammer is available with an offset or grip handle in three sizes.

Size Control Standard Reversible Gage and Wire Sets

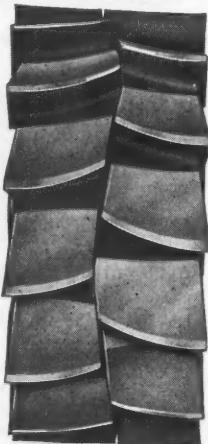
Standard reversible type gages are now being offered in sets by the Size Control Division of the American Machine & Gage Co., 4636 W. Fulton St., Chicago 44, Ill. Thread gages are available in partial or complete thread series in attractive storage and carrying cabinets with each plug hole properly identified.

Plain plug gages, also of reversible design, are available in the old or new A.S.M.E. recommended drill sizes, as well as in fractional sizes in any combination of increments of 0.001 inch or by any other size arrangement.



Size Control Standard Reversible Thread Gage Set

Standard thread or gear wire sets in any recommended series made to Bureau of Standards' specifications are also available from stock. These sets are said to be of special value in experimental laboratories or shops performing many short-run gaging operations.



PATENTED

ENJOY THE SATISFACTION OF
SUPERB PERFORMANCE

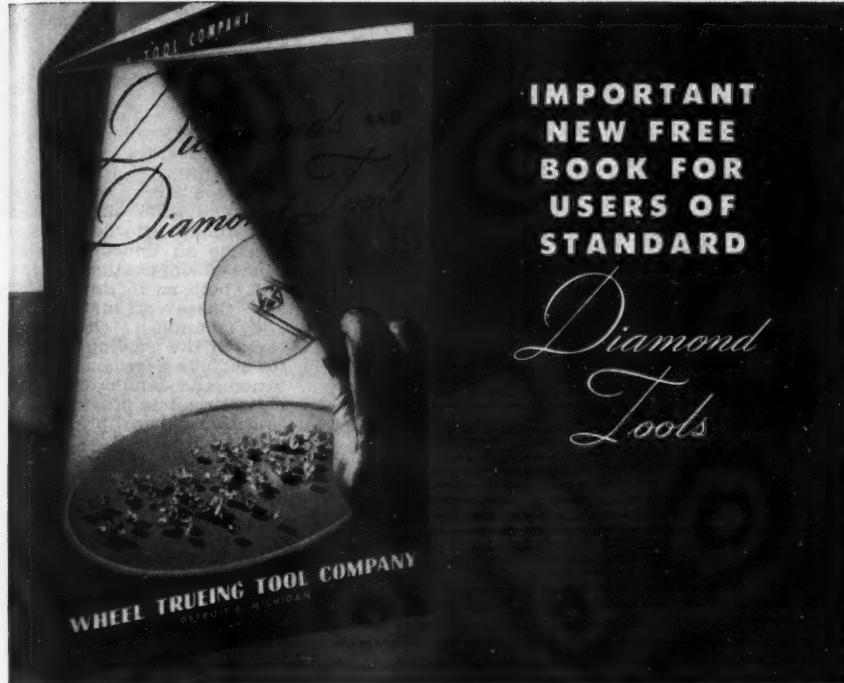
With

Aber CURVED TOOTH Milling Cutters

Maintain That Width With the
"CHATTERLESS FLOWING ACTION"
of a Curved Tooth Overlapping
Side Milling Cutter.

SEND FOR CIRCULARS

ABER ENGINEERING WORKS, Inc., Waterford, Wis.



**IMPORTANT
NEW FREE
BOOK FOR
USERS OF
STANDARD**

*Diamond
Tools*

This book of basic information on standard diamond tools will be of particular interest to the many thousands of manufacturers and fabricators whose diamond tool needs are concentrated within the range of the commonly used standard types.

These types, as manufactured by Wheel Trueing Tool Company, cover a wide variety of uses, many sizes, and designs to conform to the mechanical requirements of all machines in which these tools are used.

This booklet gives complete reference and buying information on all of these tools, including detail drawings, and

also illustrates and describes wheel dressing tools of exclusive design, turning and boring diamond tools, etc.

If you haven't already received your copy of this useful booklet we will gladly mail you a copy with our compliments.

**WHEEL TRUEING
TOOL COMPANY**

3200 W. Davison Avenue • Detroit 6, Michigan

CANADIAN OFFICES and PLANT

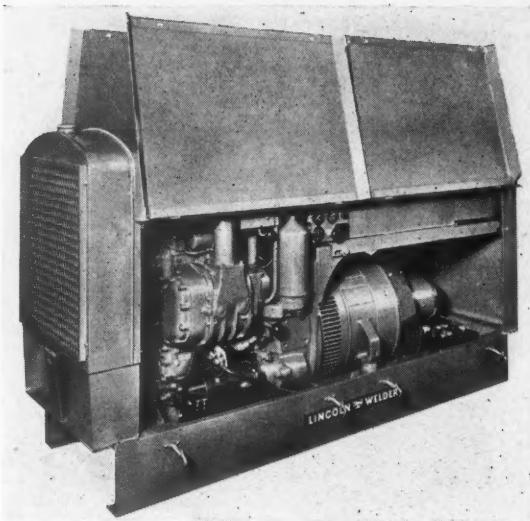
375 Langlois Avenue • Windsor, Ontario

THE ADAMANT TOOL COMPANY

Eastern Division of Wheel Trueing Tool Co.

657 Bloomfield Avenue • Bloomfield, New Jersey

Lincoln Diesel-Driven "Shield-Arc" Welder



Lincoln Diesel-Driven "Shield-Arc" Welder

A Diesel engine driven welder of 300-ampere capacity specially made for use in locations where electric power is not available has been added to the line of "Shield-Arc" welders offered by The Lincoln Electric Co., Cleveland 1, Ohio. The welder is powered by a two-cycle Diesel engine which features a simplified fuel arrangement with complete fuel filtering system, and many other special features that are said to contribute to the efficiency and service economy of the engine.

Equipped with dual continuous control, the Lincoln Diesel-Driven Shield-Arc Welder permits the operator to select

any type of arc and any arc intensity to suit the job, thus providing for an improvement in the speed, quality, and ease of welding. Moreover, the fineness of adjustment afforded makes possible an unusually wide range of application for the unit, both as to thicknesses and classes of metals and alloys handled. Other features of the welding generator include a separate excitation and laminated magnetic circuit to provide for a smoother, more productive arc at all current values.

The welding generator has an N.E.M.A. rating of 300 amperes at 40 volts. The current range for welding duty is from 20 to 40 volts, 60 to 375 amperes. The generator is of a single operator variable voltage type, with complete laminated magnetic circuit (frame and pole pieces) and equipped with interpoles. Dual control of the welding current is accomplished by adjustment of both series and shunt fields. The generator is designed to supply uniform welding current for metallic arc welding in any position with bare or heavily coated electrodes, as well as for carbon arc welding.

The generator control can be adjusted in a continuous sequence of fine steps by means of a shunt field rheostat. The current can be adjusted independently of the open circuit voltage in a continuous sequence of fine steps by means of a series field current control.

All control parts are contained in a



EXPANDING MANDRELS

Any size hole within a 1" range of infinite variation! That's what one size Champion Expanding Mandrel will completely and accurately handle. The hardened steel flexible sleeve automatically expands to the correct size as it is raised on the tapered arbor. Only 12 Champions needed for range from $\frac{1}{2}$ " to $6\frac{1}{2}$ ". Eliminates numerous solid mandrel sizes. More convenient. Proved for years by

COSTS $\frac{2}{3}$ LESS

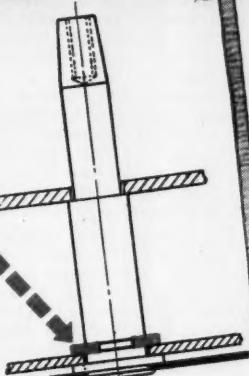
The WESTERN Tool and Manufacturing Co., Inc.
SPRINGFIELD, OHIO

UNIVERSAL

Cinemaster II CAMERA DESIGN
SIMPLIFIED BY TRUARC
RETAINING RINGS!

Footage counter assembly "watches" amount of unexposed film.

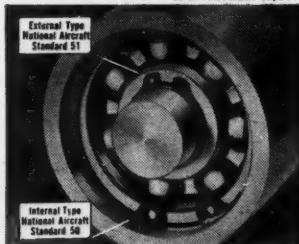
BEFORE TRUARC—
For unrivaled accuracy, this vital assembly required 3 parts, including a specially machined knurl for holding and controlling the assembly. This made servicing difficult.



AFTER TRUARC—
Use of a special crescent type Truarc ring reduces assembly to 2 parts—permits removal of footage control shaft from motor plates—makes possible quick easy servicing of all enclosed parts.

FREE! See how Truarc can improve your product—reduce production and maintenance costs. Send today for "Outstanding Truarc Applications in American Industry"—Booklet 27A.

U. S. PAT. REG. 18,144



NOW YOUR MACHINES CAN HAVE THE DESIGN ECONOMY made possible by Waldes TRUARC Retaining Rings! Truarc allows lighter, more compact units—makes assembly of machine parts quicker, easier. Its perfect circularity gives better, more dependable retention. Truarc rings save weight, space, time and costs in every type of mechanical application. There's a Truarc ring for your machines, too.

WALDES TRUARC TRADE MARK
RETAINING RINGS

WALDES KOHINOOR INC., LONG ISLAND CITY 1, N. Y.
CANADIAN REP.: PRENGO PROGRESS AND ENGINEERING CORP. LTD., TORONTO

steel cabinet. No current carrying parts are exposed. Voltage and current controls and polarity reversing switch are mounted on the "dead-front" panel of the control cabinet. The positive snap action polarity reversing switch is arranged to indicate polarity on a dial.

The exciter and main welding generator are electrically separate to improve welding performance and reduce maintenance. The exciter is direct connected on the commutator end of the generator armature. The exciter armature is mounted by means of a sleeve construction on the same shaft as the generator armature.

The generator frame is attached to the Diesel engine bell housing, and the generator shaft is connected to the engine flywheel by a special type of flexible coupling. The entire unit is mounted in a substantial channel frame. A sturdy metal grille protects the radiator front.

The pressed steel canopy of the welder is supported by heavy structural steel members. Two doors on either side are hinged at the top and provided with spring fasteners at the bottom. A hinged door at rear of the unit affords easy access to the welder control panel.

The Lincoln Diesel-Driven Shield-Arc

Welder (stationary model) weighs 2,560 lbs. and can be readily mounted on wheels, trailer, or truck for easy portability. Optional equipment includes a spring mounted running gear of the automobile trailer type with four-wheel pneumatic tires.

Besco Tweezer Spot Welding Machine

A portable unit weighing approximately 25 lb., the Besco Tweezer Spot Welding Machine illustrated herewith, product of the Tweezer-Weld Corp., 280 Plane St., Newark 2, N. J., is designed for welding metal parts measuring 0.0005 to $\frac{1}{8}$ inch round or thick. The machine consists of a cabinet, the size of a small radio, to which is connected a pair of insulated, forged copper tweezers and a foot switch. The unit is designed for plugging into a 115-volt 60-cycle power supply but may be easily adapted to 220 volts.

To weld parts from 0.015 through $\frac{1}{8}$ inch round, the machine is used with an auxiliary booster unit which is said to increase the capacity of the equipment by 300 per cent. Since the voltage used

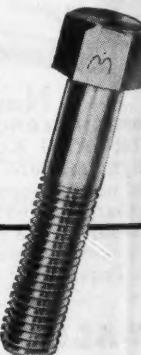
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Mac-it alloy steel hexagon head cap screws are tested for minimum tensile strength of 145,000 lbs. per square inch and heat-treated for maximum strength and toughness. Particularly useful under conditions of severe vibration.



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31 capacities.

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No. S.W.18**



P.A. *Sturtevant Co.*
ADDISON *QUALITY* ILLINOIS



Besco Tweezer Spot Welding
Machine in Use

is low and the current flows through the welding tweezers at about 1/1000 second, the tweezers may be held in the hands with absolute safety and will not heat up even after continuous usage, it is claimed. The flexible plastic-covered leads are 18 inches long.

To weld, the voltmeter of the unit is

properly set and the two pieces of metal to be joined are held with the tweezer tips and pressure applied, the foot switch being depressed at the same time. In order to weld some types of heavy gauge metal where more pressure is required, the tweezers may be removed and the machine connected to a drill press or hand arbor. Copper and copper alloy rods may be inserted as electrodes, with only the bottom electrode insulated. The machine is then operated in the prescribed manner, with more varied production being achieved. The tweezer tips may be shaped or filed to accommodate oddly formed pieces.

Transtractor

The Transtractor, an electric-propelled hand tractor which is said to combine the features of the electric hand truck

SEND FOR

These facts are taken from hundreds of actual cases showing the surprising variety of tools which can be improved by modern treatments. Among the processes mentioned are:

"SILVER FINISH"—which is clean, bright hardening . . . no oxidization or scale.

"NUSITE"—starts with soft high-speed steel and means harder, tougher cutting tools.

"AD-LIFE" — a combination of supplementary treatments to improve hardened finished tools . . . even new ones . . . no rehardening is required . . . no danger of fracture or distortion.

What manufacturers of tools, airplanes, trucks, gears, steel molds, food machinery, electrical devices, and many other fields did to improve tool quality and life is told.

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BESLY TAPS meet peak demands of the
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Besly bent shank carbon steel taps were used in making this excellent production record. Besly also makes and can supply high speed steel bent shank taps.



In threading small hexagon steel nuts on automatic tapping machines, Besly Bent Shank carbon steel Tapper Taps produce up to 20,000 nuts per 8 hour day. These nuts are $\frac{1}{4}$ -inch milled from bar stock. In obtaining this high output, production costs are reduced to an absolute minimum. Tolerances are held consistently within narrow limits.

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**MARQUETTE
MFG. CO., INC.**
Minneapolis 14,
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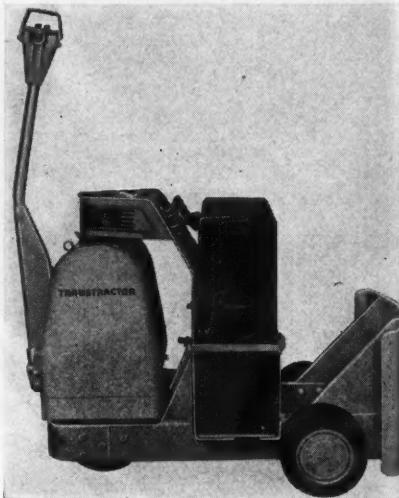


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AC ARC WELDERS • ELECTRODES
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and the conventional warehouse tractor, has been announced by the Automatic Transportation Co., 8700 S. State St., Chicago, Ill. Answering the industry's need for a small, but powerful, and maneuverable "push-pull" type materials mover, the Transtractor can, it is claimed, be used to push or pull a 6,000-lb. trailer load all day or up to 2,000 lb. intermittently, depending upon plant conditions. Finger-tip control enables one worker to handle any size or type of load.

Designed specifically for applications in



Transtractor

factories, warehouses, storage plants, and so on, requiring a towing type unit of small size and with unusual maneuverability, the Transtractor is equipped with a heavy duty bumper plate for pushing, and a coupler is available for towing operations. Featuring front-wheel drive, the unit can be readily maneuvered in close quarters. Forward and reverse drive controls are of the push-button type and are operated from the guide handle. Two forward and two reverse speeds are controlled by the vertical angle of the guide handle. Drive brakes are applied by the return of the guide handle, which springs upward automatically when released to an upright position.

Standard equipment of the Transtractor includes a battery capable of 8 to 10 hours of operation. A portable cabinet plug-in charging unit is available.

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LARGE
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SMALL PARTS
FOR
MASS PRODUCTION



● Here's the latest in the line of WALKER CHUCKS.

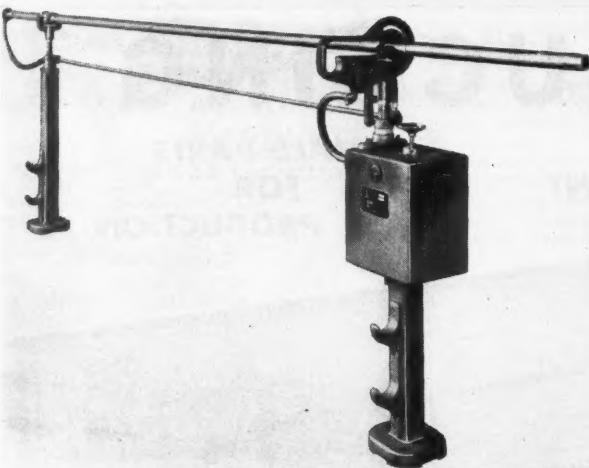
It's a 10" x 80" Longitudinal Bar Pole Chuck for chucking large equipment or holding small parts for mass production—an all purpose feature.

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to your Chucking problems.**

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Makers of Rectangular, Swivel and Rotary Magnetic Chucks.
Also Permanent Chucks.



Lipe Improved Pneumatic Bar Feed

The Lipe Pneumatic Bar Feed manufactured by the Lipe-Rollway Corp., Syracuse, N. Y., is now being offered in additional sizes and new assembly de-

Lipe Improved Pneumatic Bar Feed

signs. The type for Brown & Sharpe automatics and small hand screw machines is now furnished with newly designed pedestals which are said to offer several advantages over the design furnished for the past five years. The control cabinet has been moved to the forward end of the feed cylinder, adjacent to the machine, where the operator can make necessary adjustments without leaving his normal working position. The new pedestals have smaller floor bases and,

since they require less floor space, can be installed in cramped quarters.

For small hand screw machines, the Lipe Pneumatic Bar Feed is available in two new sizes designated as the Model 68 with $\frac{1}{2}$ -inch diameter x 12-foot capacity,

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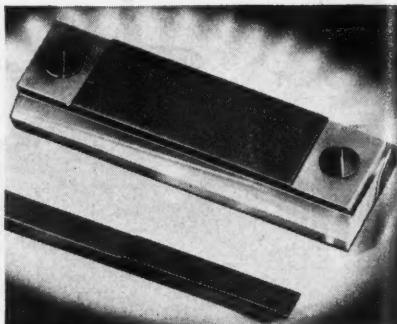
A 4954-1P-C

and Model 100 with $\frac{3}{8}$ -inch diameter x 12-foot capacity. The bar feed is also standardly available in a larger size designated as the Model 500, with capacity of 4-inch diameter for use in connection tubing or light metals.

The following models are furnished with the new pedestal design; Model 56A with $\frac{3}{8}$ -inch diameter x 12-foot capacity; Models 68 and 68A with $\frac{1}{2}$ -inch diameter x 12 foot capacity; Model 87A with $\frac{5}{8}$ -inch diameter x 12-foot capacity; Models 100 and 100A with $\frac{13}{16}$ -inch diameter x 12-foot capacity; Models 125 and 125A with 1-inch diameter x 12 foot capacity; and Model 156A with $1\frac{1}{4}$ -inch diameter x 12-foot capacity. "A" Models are for Brown & Sharpe automatics. The Models 225 and 300 continue unchanged except for minor refinements.

Wendt-Sonis Diamond "R" Files and Hones

The Wendt-Sonis Co., Hannibal, Mo., announces a line of Diamond "R" files and hones for dressing carbide cutting tools without removing them from the machine. Each file and hone contains a 100 concentration of diamonds in an ex-



Wendt-Sonis Diamond "R" File and Hone

clusive metal bond which is said to enable the tools to maintain a flat surface throughout their service life. The bond is also said to allow the tools to be used on high speed steels without loosening the diamond particles.

The file shanks are made of drilled rod stock, and each file is supplied in a handy leather case complete with instruction card. The hone is mounted on a lucite base. The file measures 6 inches long x $\frac{1}{4}$ inch wide x $\frac{1}{16}$ inch thick and



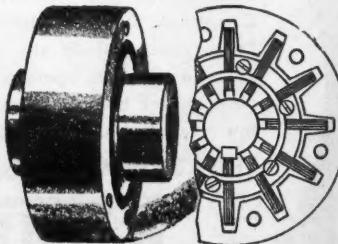
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a surprisingly large sum of money annually by driving your Production Machines with Kanti-Lever Couplings. They not only protect you against the destructive effects of misalignment but develop a Cushion Torque that absorbs the hammer blows of impact or reversing loads and dampen the torsional and radial vibration that are very largely responsible for the wear, fatigue and failure of Motors, Ball Bearings, Speed Reducers, Gears, etc.

No other Coupling is like the KANTI-LEVER; it has a circular series of resilient Cantilevers made of 200,000 lb. Tool-Steel laminations operating in slots, the tapered sides of which stiffen the spokes under increased loads and eliminate backlash. Radical arrangement of spokes prevents end thrust; special end play available up to four inches with no increase in Cantilever stresses; outer periphery useful as a Brake Drum for quick-stopping machinery.

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Kanti-lever Couplings

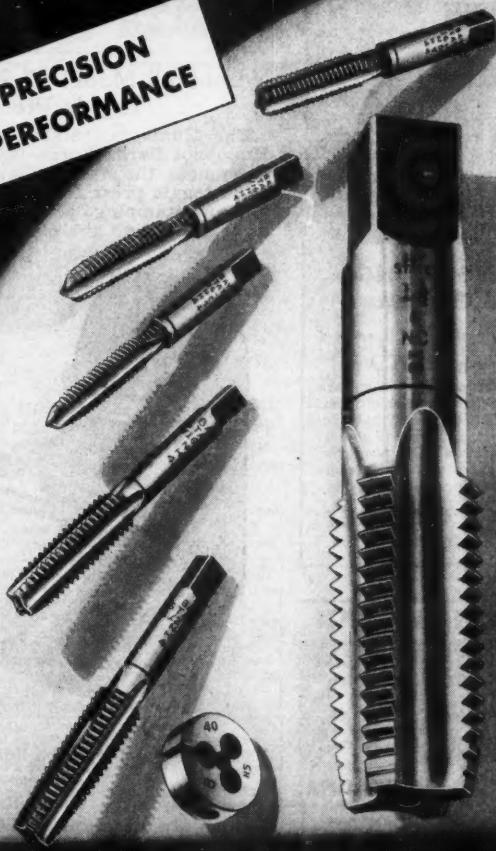


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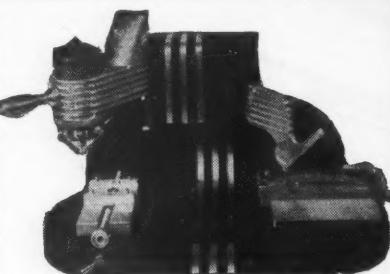
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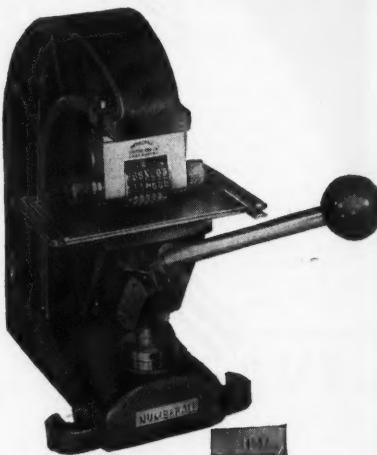
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is available in 240, 320, 400, and 600 grit. The hone measures 3 inches long x $\frac{3}{4}$ inch wide x $\frac{1}{2}$ inch thick and is available in 400 grit only.

Numberall Model 97 Bench Hand Toggle Press

The Numberall Stamp and Tool Co., Huguenot Park, Staten Island 12, N. Y., announces the manufacture of a bench hand toggle press for numbering, marking, and stamping operations. Designated as the Model 97, the press is designed to



Numberall Model 97 Bench Hand Toggle Press

exert a pressure up to 10 tons. Seven $\frac{1}{4}$ -inch characters or 14 $\frac{1}{8}$ -inch characters can be sunk into mild steel; more characters into softer material.

The Numberall Model 97 Toggle Press is designed to accommodate any Numberall numbering machines or type holders. Other attachments are also available, such as a cut-off shears for cutting off strips up to $\frac{1}{8}$ inch thick; a wire cut-off for steel wire up to $\frac{1}{4}$ inch thick; and a punch and die located on a numbering machine for making tags with holes. All attachments are quickly interchangeable.

Specifications of the Numberall Model 97 Bench Hand Toggle Press are as follows: total height of frame, 14 inches; maximum distance between frame head and top of table, 3 $\frac{3}{4}$ inches; size of table, 4 inches wide x 6 inches deep; bench space required, 11 x 5 inches.

Model

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April, 19

RECONVERT COSTS, TOO!



**Model
HD-2**

Enco All-purpose Multiple Tool Holders are ideal for both production lots . . . or single pieces. On one-operation jobs, tool change time is saved by mounting duplicate tools.

Save Time and Labor with

Enco LATHE TURRETS

Use of Enco Turret Tool Posts helps to reconvert machining costs to a new high-profit basis. You get more minutes of productive lathe time per hour. Complete jobs are set up at one time. Enco 12-station indexing avoids costly tool switching and recentering. Tools used most frequently (facing, turning, threading, boring, etc.) remain on center at all times—ready for use. These savings mean an extra profit on every job.

"A" dimension range (From diagram on this page)	MODEL 6-S 2" to 3-1/8" incl.	MODEL 4½-S 1-9/16" to 2-1/2" incl.	MODEL 3½-S 1-1/8" to 1-3/4" incl.	MODEL 2½-S 7/8" to 1-5/16" incl.	MODEL H 7/8" to 1-5/16" incl.
LATHE SWING	16" SWING & UP	13" to 16" SWING	10" to 13" SWING & BENCH LATHES	BENCH LATHES	BENCH LATHES
TOOL SIZE RANGE	5/8" to 1-1/4" or No. 2 toolholder 3/8" square bit or carbide. (Where no tool bit size is specified, turret will be furnished for No. 2 Tool Holder.)	3/8" to 3/4" (Where no tool bit size is specified, turret will be furnished for 3/4" tool bit.)	1/4" to 1/2" (Where no tool bit size is specified, turret will be furnished for 1/2" tool bit.)	1/4" to 3/8" (Where no tool bit size is specified, turret will be furnished for 3/8" tool bit.)	1/4" to 3/8" (Where no tool bit size is specified, turret will be furnished for 3/8" tool bit.)
SPECIFICATIONS	4 tool, 12 positions 6" square Mac-its Tool Post Screws Packed in crate Shpg. wt. 37 lbs. Price \$99.00	4 tool, 12 positions 4-1/2" square Packed in carton Shipping weight 16 lbs. Price \$49.50	4 tool, 12 positions 3-1/2" square Packed in carton Shipping weight 8 lbs. Price \$35.00	4 tool, 12 positions 2-1/2" square Packed in carton Shipping weight 4 lbs. Price \$23.00	6 tool, 12 positions 2-3/4" hex Packed in carton Shipping weight 4 lbs. Price \$25.00

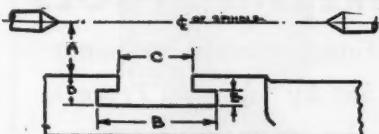
Prompt delivery can be made on all Enco Lathe Turrets. When ordering, give all dimensions and tool size.

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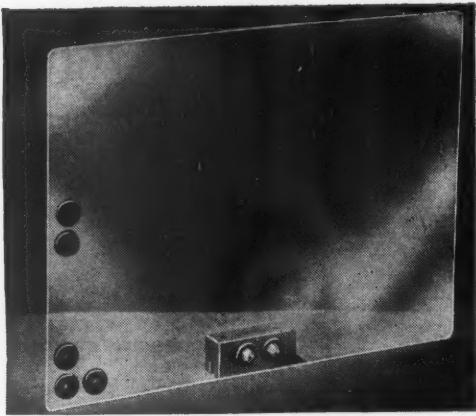


Make of Lathe and Size	A	B	C	D	E	Maximum tool size desired

Write Department 23. Ask for catalog showing 30 models for all lathes.

ENCO MANUFACTURING COMPANY

General Office and Factory: 4522-24 Fullerton Avenue, Chicago 39, Illinois



Dilley Magnetic Grip-Shield

The shield is drilled with four sets of two holes, and the magnet on which the shield is mounted can be fastened in six different positions. This special magnet measures $1\frac{1}{4} \times 1\frac{1}{4} \times 3$ inches and is said to be eight times more powerful than the standard horseshoe type used on small shields offered by the company.

The Dilley Magnetic Grip-Shield is especially designed for use where a maximum area of protection is desired and where excessive vibration on large machines necessitates an unusually powerful magnet. Constructed to protect the eyes and person from injury, the shield can be instantly removed or its position changed.

Dilley Magnetic Grip-Shield

The Dilley Manufacturing Co., 10220 Euclid Ave., Cleveland 6, Ohio, announces the addition of a new number to its line of magnetic grip-shields. The unit is made of 0.100-inch thick transparent plastic and is available in sizes of 10 x 12, 12 x 16, and 16 x 20 inches.

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Fine Industrial Diamonds
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Nelco Carboloy-Tipped Twist Drill

Production of a Carboloy-tipped twist drill especially designed for the fast cut-



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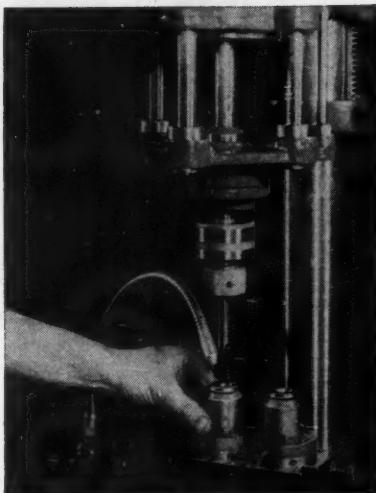
Want TO CURE SPINDLE MISALIGNMENT?

If tapping and reaming jobs are coming through constantly with oversize and bell-mouthed holes due to spindle misalignment, here's the cure!

Change over from ordinary tool holders to Ziegler Floating Tool Holders which are so designed that they automatically compensate for inaccuracies in spindle alignment amounting to as much as $1/32$ " radius, or $1/16$ " dia. Many shops have found that after getting a Ziegler Holder they could put back into service a great many taps and reamers that had been discarded because they were considered worn-out, whereas the trouble all the time was faulty alignment of the work with the spindle.

The next time a job comes through with oversize or bell-mouthed holes, get a Ziegler Floating Holder and see if it won't put an end to your difficulties!

See It In Operation
at the A. S. T. E. Show
Booth 807



Ziegler Floating Tap Holder installed
on "DETROIT" LTM lead screw
tapping machine.

Furnished with male or female taper,
straight, threaded or special shanks
to fit any machine used for tapping
or reaming.

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ROLLER
DRIVE
FLOATING HOLDER
for Taps and Reamers...

W. M. Ziegler Tool Co.

1924 Twelfth St.
Detroit 16, Mich.



Nelco Carboly-Tipped Twist Drill

ting of plastics, ceramics, cast iron, and bronze is announced by the Nelco Tool Co., Inc., Brooklyn, N. Y. Not readily dulled when used on the above mentioned

abrasive substances, the drill is claimed to have an unusually long life and is available ground to suit the material to be cut.

Properly ground, the Nelco Carboly-Tipped Twist Drill can, it is claimed, be used on glass and other extremely hard materials. The tool can also be used in drilling holes in heat-treated steel but is not recommended for such work on a production basis.

Titan No. 100 Series Self-Opening Stud Driver

Automatic take-up for wear on the jaws is featured by a self-opening stud driver designed for rugged use and also to eliminate marking of stud threads. As the threads in the jaw become worn, the action of the driving balls on the jaw drive shoulder tend to hold the jaws up in the taper nose bushing, causing them to close in on the stud.

Designated as the No. 100 Series, the stud driver, which is made by the Titan Tool Co., Fairview, Pa., can be operated at any speed desired. The tool prior to loading is shown in Fig. 1. The tool with jaws locked in full register on the stud

Experts IN THE MANUFACTURE OF

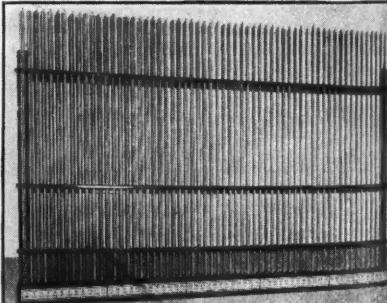
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Gears of All Types and Material—Up to 36°
MADE *Exactly* TO YOUR SPECIFICATIONS

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DRILL ROD RACK



Holds 8-10 rods from 3" length—36" length.
INDEXED—Reads easily, numbers or decimals, from No. 1-60..

CONVENIENT—Pick your size—saves time.
A necessity for any drill rod user.
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FONDA



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NEED NEVER BE REPLACED ... OR RECALIBRATED!



FOUNDA LIFETIME-CARBIDE gage blocks assure a lifetime of fine precision accuracy. Over 100 times more abrasion-resistant than steel blocks, and 98 times more than chrome-plated . . . they will show less wear after 33 YEARS of normal service than steel blocks after as little as 4 months' use.

FOUNDA'S "ULTRA-FINISH" approaches the limits of perfection, .15 to .3 r.m.s.; accuracy of size, flatness and parallelism exceed the specifications of the U.S. National Bureau of

Standards. LIFETIME-CARBIDE gage blocks are guaranteed not to grow or shrink over any period of time. Now, truly, the introduction of a complete 82-piece set of carbide gage blocks is the most outstanding development since the inception of gage blocks.

Sizes in the 82-piece set range from .050" to 4.000", including a .10005" block, making possible 480,000 combinations! In the 35-piece set, sizes range from .100" to 4.000" with over 80,000 combinations.

Both sets, as well as individual blocks, are available in Grades "AA" ($\pm 0.00002"$), "A" ($\pm 0.00004"$), and "B" ($\pm 0.00008"$).

Write for detailed information.

FONDA

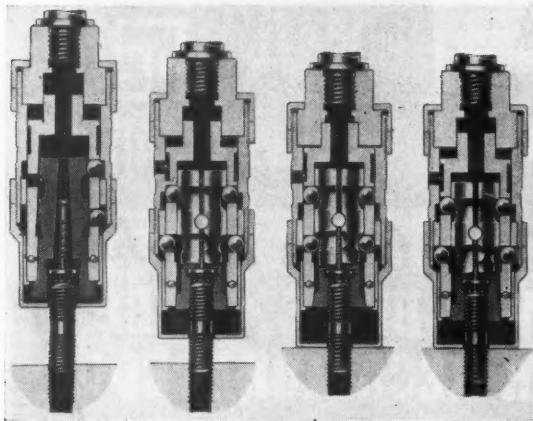
Gage Blocks

CARBIDE OR STEEL
(PATENTS PENDING)

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Agents in all principal cities throughout the world

MANUFACTURERS OF THE NEW LIFETIME-CARBIDE AND CARBIDE-STEEL GAGE BLOCKS



Titan No. 100 Series Self-Opening Stud Driver

jaws are locked in position, the tool is free to be brought down into a positive driving position, the two lower balls doing the driving directly on the jaw. The driving balls also pull the jaws up into the taper nose bushing as the stud is driven to the proper depth. After the stud has been driven to the correct projection height, the cycle reverses and all driving force is removed from the jaws, as shown in Fig. 4. The drive balls again are in a free position but with the jaws still locked in full register, as shown in Fig. 2.

The jaws open up when the tool is lifted up to drive the next stud.

The Titan No. 100 Series Stud Driver is made in four sizes: for $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{5}{16}$ -inch studs; for $\frac{5}{16}$, $\frac{3}{8}$, and $\frac{1}{2}$ -inch studs; for $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ -inch studs; and for $\frac{3}{4}$, $\frac{5}{8}$, and 1-inch studs. The clutch on the driver can be renewed by pressing the cam ring out of the main ring, reversing it and

by the upper balls, but without the lower balls in positive driving position, is shown in Fig. 2. The lower balls then join the upper balls in locking the jaws in full register with the stud (Fig. 3) before any driving force is applied to the stud. At this point, the tool can revolve, with the exception of the jaw, ball bearing nose bushing, and the stud. After the

STEEL STACKING BOXES

Top Rim Type 18" x 12" x 6".

16 Ga. with Drop Handles

at \$1.27 each



STANDARD SIZES

18 x 12 x 6.....16 Ga.

18 x 12 x 8.....16 Ga.

16 x 10 x 6.....18 Ga.

16 x 10 x 6.....16 Ga.

MADE IN OTHER SIZES



BENCH LEGS

Four sizes. All Welded.
Olive Green enamel.

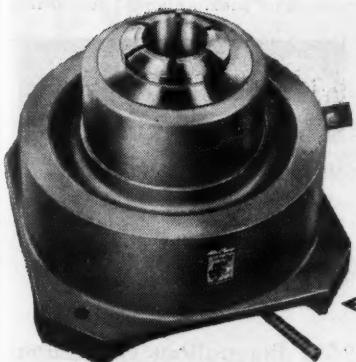
BENCH TOPS

Steel and wood with or
without drawers.

Literature on request.

STERLING
FACTORY EQUIPMENT CO.

183 CHARLES ST.
PROVIDENCE, R. I.

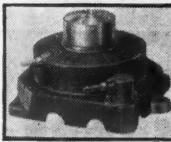


MEAD AIR COLLET FIXTURES

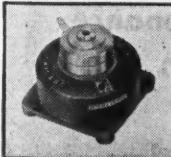
← JC-2



LS-1 and LS-2

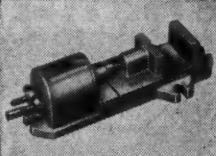


LS-3 and LS-4



Pygmy Collet

JC-2 holds bar stock up to $2\frac{1}{2}$ " and with step chucks handles shallow circular shapes to 5". Used wet or dry. Coolant issuing through the collet lubricates, cools, washes away chips. The smaller models hold stock for heavy machinery operations, yet with a suitable pressure reducer, they will gently handle the most delicate precision parts as low as $1/16$ " diameter. Work automatically ejected. Foot pedal frees operator's hands. These high production precision fixtures will help you produce more second operation work quicker, cheaper, better.



CATALOG READY

Write for complete
MEAD AIR POWER
CATALOG of Pneumatic
work-holding
equipment.

**MEAD
AIR OPERATED
DEVICES**
save precious
man-hours!



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SPECIALTIES
COMPANY**

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DEPT. AA-46
CHICAGO 41, ILL.

pressing it back in, thus obtaining double wear. A repair kit is available for this operation.

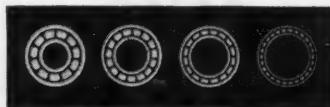
For applications where it is desirable to limit the amount of torque applied to the stud during driving, a special controlled stud driver is available. This tool has an adjustable over-running clutch so that the stud can be driven at any predetermined torque. Both types are said to be unusually accurate in maintaining projection heights.

Miniature Super Light Ball Bearings

A series of super light ball bearings with outside diameters of $\frac{1}{8}$ inch and bores of $\frac{1}{16}$, $\frac{1}{8}$, $\frac{5}{32}$, and $\frac{1}{4}$ inch is announced by Miniature Precision Bearings, Keene, N. H. The bearings are manufactured of chrome bearing steel and finished to precision tolerances of plus 0.0000 and minus 0.0002 inch.

The Miniature Super Light Ball Bearings are designed for use in small motors, computers, electronic equipment, drive movements of recording devices, testing and laboratory equipment, and

for supporting the moving parts of various precision mechanisms. According to



Miniature Super Light Ball Bearings

the manufacturer, the bearings are made to accommodate unusually heavy loads and high speeds for their size and weight.

P&W Electrolimit Continuous Gage

To meet the metal rolling industry's requirements for a continuous "flying mike" which will reach in farther on the rolled strip material than standard gages, Pratt & Whitney, Division Niles-Bement-Pond Company, West Hartford, Conn., has announced the Model D-10 Electrolimit Continuous Gage.

This gage has a throat depth of 10

Libert **Hi-Speed SHEAR**

CIRCLE CUTTING ATTACHMENT
Included as
STANDARD EQUIPMENT
with this Machine

MODEL 1236
36-in. throat.
12-gauge capacity.

WRITE FOR BULLETIN

SIMPLIFIES Maintenance
SPEEDS Production
SAVES Manpower

In wartime work, the *Libert* has amply proved its advantages by turning out top production—shearing flat or formed sheet metal, internal or external, plain or irregular shapes *rapidly, accurately, cleanly!*

Equally effective in maintenance work, *Libert* is cutting costs to rock bottom. Edges are smooth, need no finishing. Unskilled operators produce accurate work at once.

Sizes up to 60-in. throat, 10-gauge capacity.

LIBERT MACHINE COMPANY
Green Bay, Wisconsin

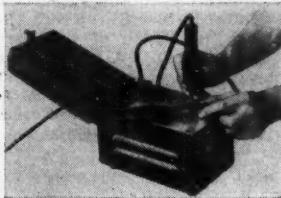


...for Production Marking!

Designed for Machine Shop Use
IDEAL

TOOL-ROOM ETCHER

Electrically writes on smooth-surfaced iron, steel and their alloys. Permanently marks reamers, drills, dies, etc. . . . 4 Heats — 120 to 700 watts.



OTHER IDEAL Accessories include: Live Centers, Lathe and Magnetic Chucks, Demagnetizers, Grinding Wheel Dressers, Dust Collectors, Granite Surface Plates, etc.

PROMPT DELIVERY

IDEAL
"E-Z MARK" ETCHER

New—Revolutionary—Reproduces instantly—from a film—anything you can write, typewrite or draw. Permanently marks name plates, products, metal parts, tools—anything made of steel, brass, copper, zinc, alloys. For repetitive marking—marks many times from same film. Anyone can use it—simply place part to be marked on film—press button — IT'S DONE! Safe — NO harmful acids.

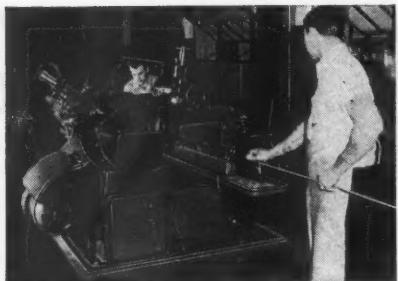
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and Etchers on the market.*

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RESTORING THE BALANCE OF PROFIT

Incredible accuracy at hundreds of pieces per hour . . . this is an important Ace achievement that can help you counterbalance rising production costs. Typical of the fine precision Ace delivers on a mass-production scale are these balance-arm shafts. Small bearing surface and angle at each end are ground on centers while the larger diameter is centerless ground. The whole job is held to a tolerance so close that it would make your whiskers look like broomsticks.

RELY ON ACE FOR PRECISION GRINDING Centerless, Internal Cylindrical, External Cylindrical, Blanchard Surface, Plain Surface, and Thread Grinding.

PRODUCTION MACHINING Turning, milling, drilling, cutting, tapping, and threading of small machine parts that require precision grinding—on a mass-production basis.

METAL STAMPING Blanking, forming, and extruding of small metal parts on presses up to 75-ton capacity. Spot welding, sub-assemblies and assembly of intricate radio and machine parts.

HEAT TREATING Electric and gas furnaces, individually pyrometer controlled, for high-heat, quenching, and carburizing of parts up to approximately $10^{\prime\prime} \times 10^{\prime\prime} \times 15^{\prime\prime}$.

TOOL AND DIE WORK All operations for the production of Punches and Dies for small stampings, for Jigs, Fixtures, Gages, Moulds, Form Blocks, Tool Bits and Circular Form Cutters.

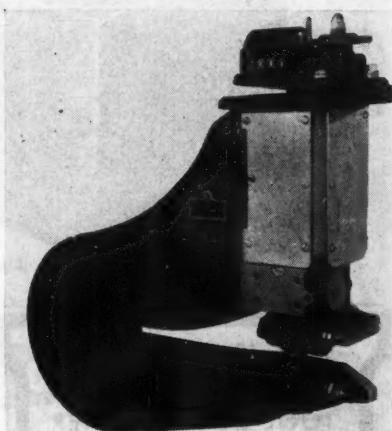


ACE MANUFACTURING CORPORATION
for Precision Parts

1235 E. ERIE AVE. PHILADELPHIA 24, PA.

inches, which makes it possible to measure to the center of strip material up to 19 or 20 inches in width. With narrower strip material, this gage will allow the full width of the strip material to be measured.

The casting of the gage head is made of Invar, which has the lowest coefficient of expansion of all the metals. Therefore, the stability of the gage under the most adverse conditions is assured. The deep throat casting can be assembled at the factory to any standard Model D Gage. This unit then can be assembled to the present designed mill mountings



P&W Electrolimit Continuous Gage

where the rail is mounted vertically.

The Model D-10 differs from the Model D only in the depth of the throat and the main casting. All other parts are interchangeable. Like the standard P&W continuous gages, the Model D-10 is accurate to 0.000025 inch under constant-temperature conditions.

X-Ray Scanner for Searchray 150 X-Ray Unit

Designed to overcome the difficulties of distortion and displacement, an X-ray scanner for use with the Searchray 150 X-ray Unit has been announced by the North American Phillips Co., Inc., 100 E. 42nd St., New York 17, N. Y. The scanner unit measures 32 inches long x 14

HEAT TREAT SMALL PARTS

In Your Own Plant

ESSENTIAL FOR TOOL AND DIE SHOPS

You save time and money heat treating small tools and dies in a Cooley Electric Furnace. Uniform temperatures are maintained throughout the furnace chamber to assure even heating of parts. The heating elements are embedded in refractory materials, protecting against atmospheric attack. They are easily replaceable.

ECONOMICAL TO OPERATE

To hold 1600° F. in the MH-3 furnace requires less than 2 kw. At power rate of 2c per kw.-hr., operating cost is under 4c per hour. The MH-4 furnace requires less than 2.5 kw. or under 5c per hour at the same rate. Cooley Furnaces are easily installed—ready for immediate service by connecting power lines to two terminals. Quiet in operation—no fumes or odors—no ventilating necessary—they can be located at any convenient place in the shop.



TWO NEW OPTIONAL FEATURES AVAILABLE

1. Vertical Lift Door—Counter weighted for ease of operation—conserves heat where door need not be fully opened to enter or remove work. Supplied in place of standard hinged hearth door at \$20.00 additional to regular furnace prices shown below.



2. Heavy Gauge Steel Stand—For ease of installation and operation—locates furnace at most convenient operating height and provides additional working and storage space. Add \$35.00 to regular furnace prices shown below.

NO SALESMEN WILL CALL

Ask for free information and ordering instructions so you can make your own decision and determine your own requirements. Write for Bulletin No. 50 today—no obligation.



AVAILABLE IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14)L	29.6	3400	14.8	\$146.00*
MH-4	10"W 6"H 18)L	4800	20.9	\$222.50*

*Includes Hearth Plate

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.
AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire—approximately \$150.00.

COOLEY ELECTRIC MANUFACTURING CORP.

34 South Shelby Street Indianapolis 7, Indiana

Export Department, 1111 S. Ferry Building, New York 4, New York

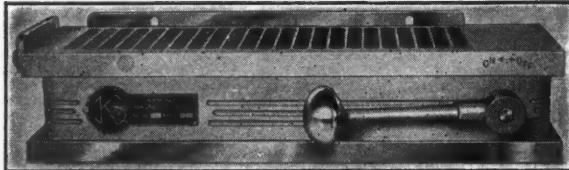


Close-up view of X-ray scanner showing adjustable slit (top) and specimen table which motor drives from left to right

inches wide x 16 inches high and consists of a motor-driven table on which the specimen and film move beneath an adjustable slit through which the X-rays pass. The table speed varies from $\frac{1}{2}$ to $1\frac{1}{2}$ inches per minute and can be adjusted to suit each particular application.

Constructed to precisely record the geometric relationships of integrated components and spacings of segmented specimens, the scanner is said to be especially useful in the manufacture of vacuum tubes, capacitors, switches, breakers, timing devices, storage batteries, or any precision assembly where space measurements are desirable after parts are integrated. When fine grain X-ray film is used, enlargements may be made for the more accurate determination of element position and condition, the enlargements serving as a means for checking component changes after certain periods of service. The scanner may also be used to accurately determine unknown thickness of material and to study the intergranular structure of metals and plastics.

KAR Permanent Magnet CHUCKS



Cannot Fail

Hold Work Tight

Generate No Heat

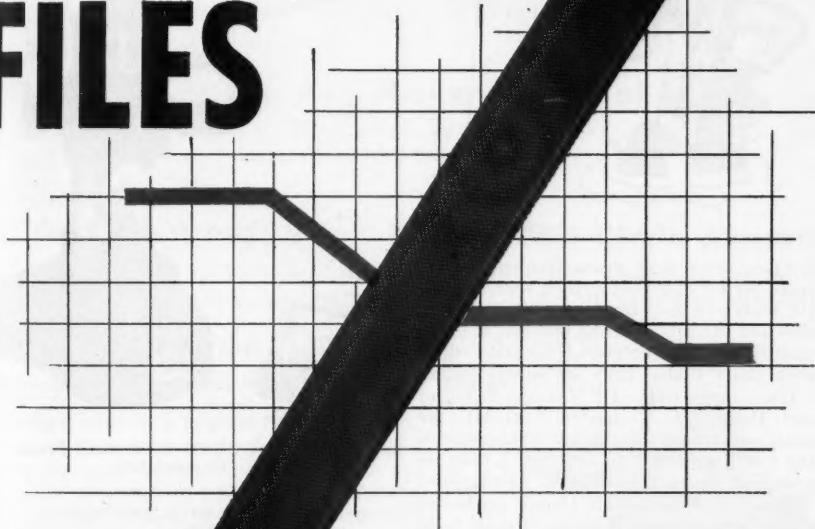
An outstanding and exclusive advantage of the KAR Permanent Magnet Chuck is its ability to hold smaller pieces securely due to the close spacing of the pole pieces.

**Release Easily
Used Wet or Dry
Use No Power**



THE KAR ENGINEERING CO., Inc.
GREAT BARRINGTON MASSACHUSETTS

SIMONDS Red Tang FILES



...they keep your File-Costs down

RED TANG FILES have the same basic tooth-design as Simonds Metal-Cutting Saws. So Red Tangs *cut*, instead of *scrape* . . . remove more metal with less elbow-grease. That's why workers like them. *And here's why YOU will like them:* They last longer . . . and deliver more and better work per file-dollar. Order Simonds Red Tang Files from your Industrial Supply Distributor, or from the nearest Simonds office listed below.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 31 W. Trent Avenue, Spokane 8, Washington; Canadian Factory: 595 St. Remi St., Montreal 30, Que.





It takes more than a non-ferrous alloy to make perfect cast-alloy cutting tools. Delloy CA tools owe their higher red-hardness to a new and exclusive casting process. It is the casting "control" that gives Delloy the "edge" over other tools. They are plenty tough.

Don't forget Delloy GP (General Purpose) and Delloy TC (Tungsten Carbide), the other partners of this famous trouble-shooting trio. Together with Delloy CA, they are your best answer for "allmetal" cutting jobs.

Standard tools of all Delloy grades in stock for immediate delivery. Special tools promptly made up to your order. Send us a sample or blueprint for quotation. Your copy of the new Delloy catalog is ready.

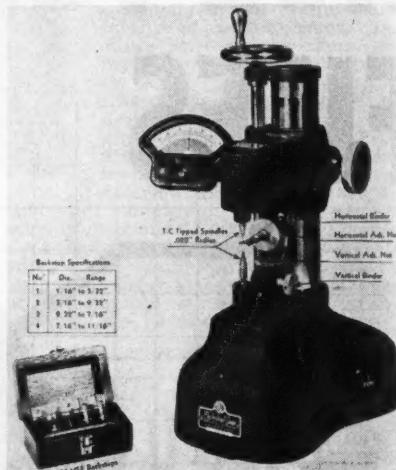
Delloy
METAL CORPORATION
CUTTING TOOLS

Affiliate of Ace Manufacturing Corporation
1201 East Erie Ave., Philadelphia 24, Pa.
Sales Representatives in all Principal Cities

P&W Model CE-699 Electrolimit External Comparator

Announced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., the P&W CE-699 Electro-limit External Comparator illustrated herewith is equipped with a special gaging spindle, anvil, and backstop, thus making it ideally suited for the inspection of balls.

The gaging spindle and anvil are identical pieces, each having a T-C gag-



P&W Model CE-699 Electrolimit External Comparator

ing tip with a 0.020-inch radius. The backstop is a T-C vee located in the anvil fixture with provision for both vertical and horizontal adjustment. The indicating meter can be graduated in "tenths," "half-tenths," or "hundredths" to meet any inspection requirement. •

Hopper for Stackbin Assembly Bins

Designed to reduce by as much as 75 per cent the time required in traveling back and forth to replenish parts, a hopper for Stackbin assembly bins is announced by the Stackbin Corp., Providence, R. I. The hopper is said to increase the capacity of the assembly bin

You Can Get
More Production
from Your
LATHES

MODERNIZE
NOW
with
LYNN

Heavy Duty . . . Self-Indexing

ED TURRETS . . . For Any Make or Size of Lathe

To replace worn or Inaccurate Turrets and to convert Engine Lathes for Speedy and accurate turret work.

Double Locking

TOOL POST TURRETS . . . T Bolt or Bolt Circle Mounting

To cut set-up time and increase Production. Designed to take the heaviest possible cuts without turret raising off the base of the post.

LYNN No. 2 HYDRAULIC DRIVE

Operation of All Standard Make Turrets—10" Travel or Less

Results of Operation in a Typical Plant . . .

It was machining brass castings and running 3 operations on each piece. This plant had run several million pieces over a period of years. The LYNN No. 2 Hydraulic Drive on a comparative production basis showed the following—

2370 pieces per day as against the previous average of 1900.

The quality of product was completely maintained.

Breakage of tools was greatly reduced over previous minimum.

There was a substantial reduction of the fatigue element.

Production was so controlled that it could be accurately computed in advance.

QUICK SERVICE—Through our conveniently located jobs—Our several factory offices or direct with our main office.

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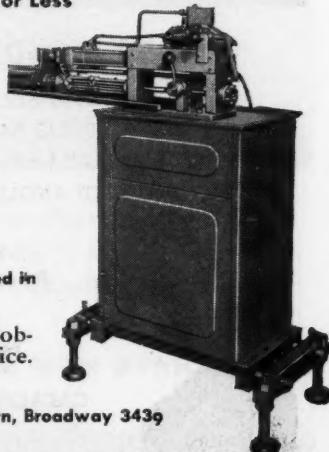
Milwaukee . . . 1224 W. Clybourn, Broadway 3439

Chicago . . . 185 N. Wabash, Room 1111, Dearborn 2581

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WIRE, WRITE OR PHONE FOR COMPLETE DETAILS

LYNN manufactures a complete line of Bed Turrets, Tool Post Turrets, Cross Slides, Lathe Legs, Splash Pans and other equipment for every make and size of lathe.

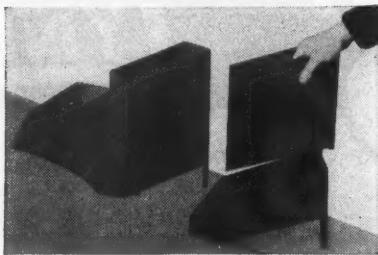


LYNN MANUFACTURING CO.

220 ELROY STREET
MINNEAPOLIS 8, MINN.

approximately four times, thus conserving bench space and also reducing costly interruptions in assembly work.

Nesting together like Stackbins, the



Hopper for Stackbin Assembly Bins

hopper tapers toward the front so that when a series is set up the assemblies are in the form of a conveniently accessible semi-circle. The hopper is made of heavy gauge sheet metal with welded construction throughout and is finished in baked-on olive green enamel. Attached to the assembly bin, the hopper is said to remain absolutely rigid and to nest without the use of any tool or fas-

tening device, thus enabling it to be easily and quickly removed when a change is made in the setup on the bench. According to the manufacturer, particular care has been taken in designing the hopper to avoid interference with hand motion and to control the flow of parts into the forward section of the bin.

Honan-Crane Sump Cleaner

Announcement has been made by the Honan-Crane Corp., 638 Wabash Ave., Lebanon, Ind., of a sump cleaner designed for the quick, convenient removal of dirty oil, dirt, chips, sludges, scale, and so on, from sumps or tanks of machine tools, gear cases, compressors, engines, and quenching systems, as well as sumps and tanks containing other liquids. The sump cleaner is a mobile, self-contained unit, sturdy and simple to operate, consisting of a tank, motor-driven pump, long suction hose with specially designed nozzle, and large roller bearing wheels which permit transportation to any point with a minimum of effort.

In operation, the unit is wheeled to a sump or other tank and the suction noz-

WHITNEY-JENSEN PRODUCTS
10 YEARS EXPERIENCE

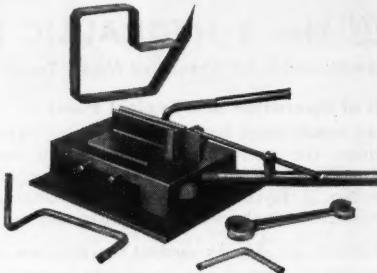
No. 52 BENDER

CAPACITY, MILD STEEL

1/2" ROUND SOLID BAR

1/4" x 2" FLAT BARS

1/2" x 2" NOTCHED ANGLE IRON



Bender is easy to operate and ruggedly built.

Patented adjustment automatically compensates for the thickness of metal.

No. 50 ANGLE IRON MITRE NOTCHER

CAPACITY—ALL SIZES OF ANGLE IRON THRU 2" x 2" x 1/4"
WEIGHT—62 LBS.

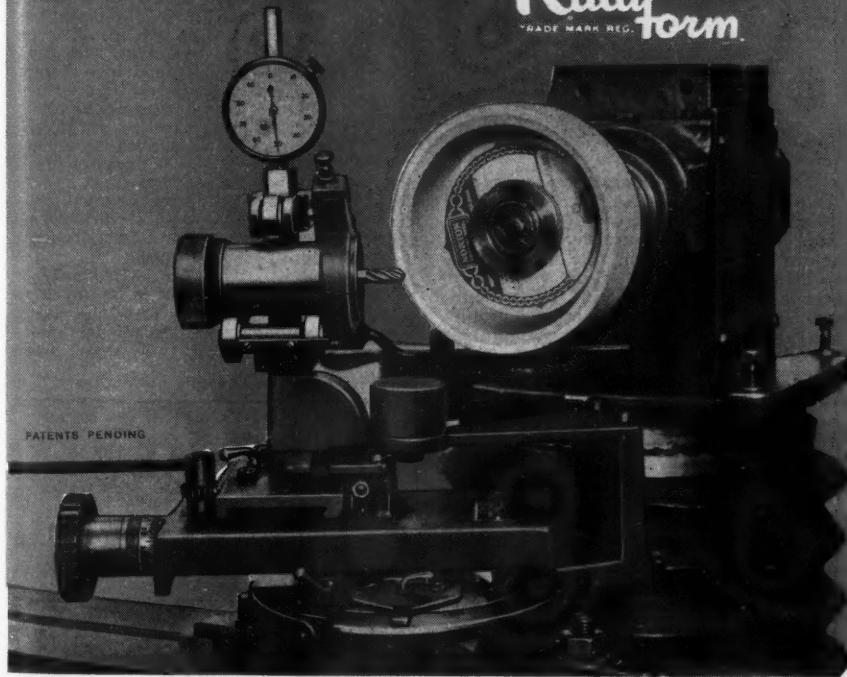


WHITNEY METAL TOOL COMPANY
110 FORBES ST. • ROCKFORD, ILL.

HERE IT IS!

THE IMPROVED MEYERS

Radiiform
TRADE MARK REG.



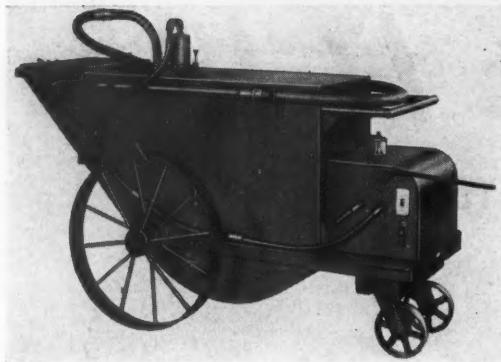
•THE ONE MACHINE that generates the form direct on, End Mills, Tool Bits, Milling Cutters and similar tools in high speed and tungsten carbide without first forming the grinding wheel; also forms grinding wheels.

THE IMPROVED MEYERS RADIFORM NOW AVAILABLE

For further information and details wire or write

W. F. MEYERS COMPANY • ESTABLISHED 1888
1014 FOURTEENTH STREET • • • BEDFORD, INDIANA

Honan-Crane Sump Cleaner



zle is inserted, the operator moving the nozzle into all angles and corners to collect all liquid present until the tank or sump has been thoroughly cleaned. A vacuum relief valve on top of the tank can be adjusted to control the vacuum in accordance with the liquid being handled. When the tank is filled, the liquid rises into a float control valve chamber and opens a vacuum limit switch, thus stopping the motor and thereby avoid-

ing pulling sludge or liquid through the pump.

When the sump cleaner has been filled, if all liquid and sludge are to be dumped, it is transported to the dumping pit and the lid removed. The tank can then be tipped into dumping position with little effort. Should the contaminated oil or liquids have salvage value, the sump cleaner should be let set idle for 15 to 20 minutes until

heavy solids settle to the bottom. A drain on the front side of the tank permits the top portion of liquid to be drawn off, leaving chips and abrasives in the bottom to be dumped.

The capacity of the sump cleaner is 80 or 125 gallons. The unit is mounted on a rugged steel frame, and the large wheels provided enable it to be easily moved about on any type floor, even when fully loaded.

**SAVE TIME
on intricate, angular
SET-UPS**

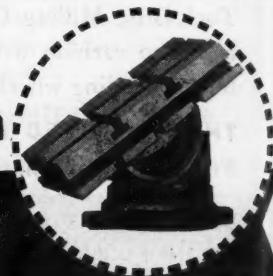
Fully universal . . .
three swivels simplify the
setting of compound angles.
Parts interchangeable . . . can
be used as a plain flanged vise,
a swivel vise or multi-swivel vise.

Write for
name of nearest
distributor

Multi-Swivel VISE

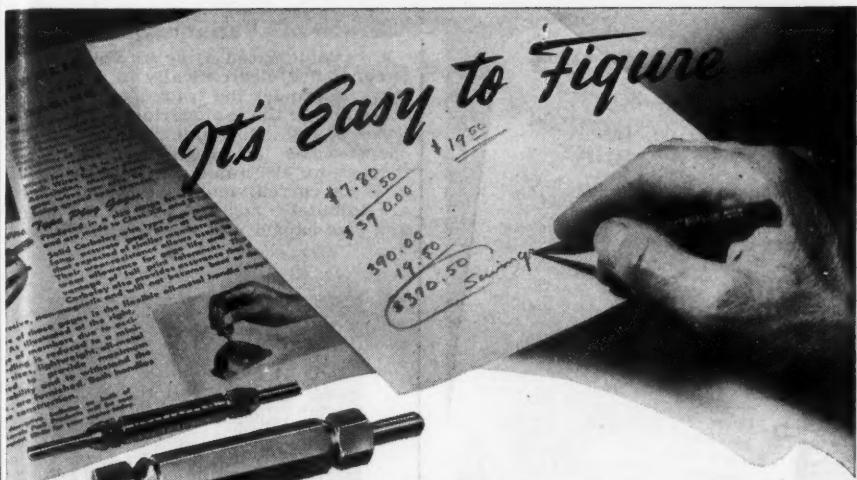


The Platen increases capacity of the
unit. Vise and Platen are interchangeable.



MASTER TOOL CO.

161 HIGH STREET • BOSTON MASS.



Tremendous Savings

WHERE These GAGES OFFER IN INSPECTION COSTS

If you use plug gages under $\frac{3}{8}$ " diameter, you owe it to yourself to compare these Lincoln Park gages—in eventual cost, lasting accuracy and practicability—with any

other gages used for the same purpose.

Lincoln Park Wire Type Plug Gages made of cemented-carbide are approximately two and one-half times the price of similar gages made of steel. But the accurate service life of these gages is at least fifty times greater than can be expected of the best steel gages. This in itself represents sizeable savings in actual dollars and cents.

In addition, there are many other important advantages—offering even further inspection economies. Complete information on Lincoln Park Wire Type Plug Gages is contained in a new bulletin—yours for the asking.

Also New! THREAD AND GEAR MEASURING WIRES



... made of cemented carbides. Ground and lapped to standard tolerances closer than N.B.S. specifications. Retain accuracy fifty times longer than steel wires. Write for new bulletin.



Lincoln Park INDUSTRIES, INC.

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1946

TAPPING TIPS

From Woody Spencer's Notebook

SLOW MOTION IS FUNNY

In the Movies, But
It Won't Pay in Tapping



Some fellows just can't seem to get the idea that precision tapping CAN BE fast. But time after time it's been proved that the best work is done when the tap is run at the highest speed consistent with the material, lubricant and type of machine used. There's a good cutting speed table in my Handy Tapping Guide. Run your taps at the proper speed and you'll find you get smoother, more accurate threads, faster production and longer tap life.



These Tapping Tips aren't designed to carry engineering advice on tapping problems. They're really friendly hints, picked up by Woody from the boys in the shops he calls on, and passed on for whatever good they'll do. If they make some job run a little easier or quicker or maybe cut costs or save some headaches, we'll feel they're well worth while.

The individual technical problem that comes up so frequently should have a definite engineering recommendation. If you will send us complete data—material, type of hole, diameter and depth, lubricant, etc., our engineers will be glad to offer specific suggestions.

NOTE: Woody Spencer's Tapping Tips will appear here as often as Woody gets time to write them up. Look for them.

Woody Spencer's Handy Tap Guide is full of helpful information on tapping. It's all arranged in convenient indexed form for quick, easy use. It's FREE. Write for your copy on the company letterhead.

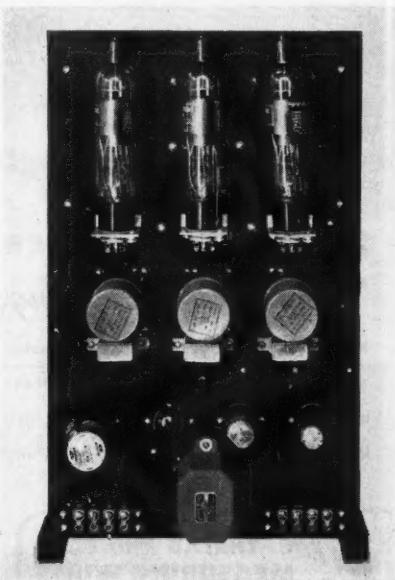
THE RIGHT TAP AT THE RIGHT TIME



The Woody Spencer Company
Cleveland 5, Ohio

"Servotron" Variable Speed Drive

A variable speed drive in which speed is controlled electronically is now being marketed under the trade name of "Servotron" by the Submarine Signal Co., 1602 State St., Boston 9, Mass. The drive operates on alternating current and through an electronic controller actuates a direct current motor at speeds which are infinitely variable within the speed and load capacity of the motor. The unit



Control Panel of "Servotron" Variable Speed Drive

is said to maintain uniform torque over the entire speed range.

According to the manufacturer, the Servotron features instantaneous dynamic braking and instant reversal without speed overrun. The unit is available in various sizes.

P&W Model R2 Air-O-Limit Comparator

To enable hand gaging to be performed at a distance from the comparator, Pratt & Whitney, Division Niles-Bement-

A
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M
P
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S

**the Wade No. 8A
toolmakers'
lathe ...**



has such features as ...



1. A spindle supported by an SKF double row cylindrical roller bearing plus two heavy duty precision roller bearings, all preloaded.
2. Especially designed collets, tools, and attachments to insure enduring accuracy and long life.
3. Rugged, exact construction throughout every part and every assembly.

which result in ...

1. A spindle of greater rigidity permitting heavier cuts, smoother finishes, greater accuracy, and increased production.
2. Longer precision ground collet bearing surfaces that assure true running throughout a long life—a greater range of regular turning operations plus grinding and the turning of odd shapes.
3. An ability to turn out tools and parts with a degree of precision not usually possible in larger, or smaller, machine tools.

These advantages, plus twelve spindle speeds from 35-2000 R.P.M., lead screw accuracy of $\pm .0005$ per foot of lead, a unique, quick-operated, belt-shifting mechanism—and extremely sensitive control all add up to make the Wade No. 8A Toolmakers' Precision lathe a highly productive, extremely accurate machine tool with an exceptional stamina that means extra years of profitable operation.



The Wade Tool Co.
54 RIVER ST.
WALTHAM 54, MASS.

THE WADE TOOL CO.

54 River Street
Waltham 54, Mass.

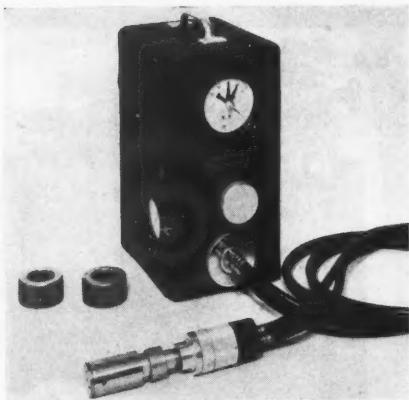
Please send me without obligation your Catalog giving complete details on the Wade No. 8A Toolmakers' Lathe.

Name _____ Title _____

Company _____

Street _____

City _____ State _____



P&W Model R2 Air-O-Limit Comparator

Pond Co., West Hartford, Conn., has brought out the P&W Model R2 Air-O-Limit Comparator illustrated herewith. The unit is equipped with a booster relay which permits the use of any length hose between the gage cabinet and the gage plug without any loss of speed or accuracy in the gaging operation.

Murex High Tensile Arc Welding Electrodes

The addition of two complete series of all-position tensile arc welding electrodes to its Murex line is announced by the Metal & Thermit Corp., 120 Broadway, New York 5, N. Y. One series of electrodes has AWS-ASTM XX10 type of coating and the other, a coating of the AWS-ASTM XX13 variety. Individually, there are eight electrodes in all, one classified as AWS Grade E-7010, one E-8010, one E-9010, and one E-10010, all for use on direct current with reverse polarity, and a companion electrode to each having an XX13 coating for use on alternating current or on direct current with straight polarity.

Developed to meet the requirements of fabricators of power plant piping and equipment but applicable to a variety of welding applications involving high tensile steels, the electrodes provide a wide range of well-balanced mechanical properties which enable a weld metal very closely matching many high strength steels in tensile strength and ductility to be selected. In addition, the all-position feature and the two types of coating provide versatility to meet a variety of working conditions.

ENGINEERS—PRODUCTION—INSPECTION MEN! BOOST PRODUCTION and PRODUCT QUALITY — 15 DAY SHIPMENT ON URGENT ORDERS

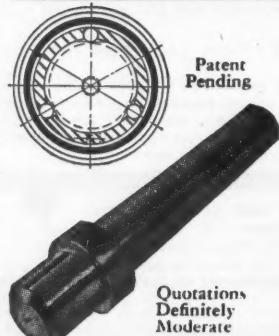
Curtiss-Wright Corporation ranks our product with *their* best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts

WITH

YOUNG ROLLER CLUTCH PRECISION MANDRELS

No More "C" Washers, Wrenches, Drawbars, No More Arcs or Tapers Before or After Expansion Grip—Concentricity in Low 10,000ths—Production or Inspection.

Assured parallelism of sleeve surface to center line—absolutely no variation in repeated mounting of parts. Uniform full-work-length friction-locking gives complete control and contact of entire bore surface area—Absolutely no variation in repeated mounting of parts—no tapers—Slip part on mandrel with slight counter-clockwise motion, that's all—it's ready—Self-contained, self-expansion, self-locking, self-contraction. Instant unloading, no jamming, no adjusting—Interchangeable sleeves—you do not obsolete Young Mandrels.—Built to your bore tolerance high limit, with automatic contraction to low limit—Any mounting—Any machine operation—For bore diameters .718 to 5.5—Reduces tool costs, extra equipment investment, operating costs, maintenance, down time, scrap, salvage.



Quotations
Definitely
Moderate

Gund Delivery Schedules

YOUNG ARBOR CO., 3257 Bradford Road, Cleveland Heights 18, Ohio

If you BEND metal

Your cost—by any method other than with a Buffalo Bending Roll—high. We know that's so, because Buffalo Bending Rolls are reducing costs in thousands of plants. There are two general types, standard bending rolls for angles, squares, rounds and structural shapes, and Wrapping Rolls for making cylinders of metal up to — thick. The two bulletins illustrated at the right give full details of construction and capacities. Standard rolls, Bulletin **352-A**: Wrapping Rolls, Bulletin **315-A**.



If you CUT or PUNCH metal



The structural steel shop warehouse or general repair shop has continuous use for a Universal Iron Worker. Triple-purpose machine, the U. I. W. keeps busy on plates, flats, angles, tees, beams, rounds, channels,—in fact, any standard shape. Forging shops, on the other hand, have need for a machine to cut round or square stock in quantity. For this work, Buffalo Billet Shears are ideal. Built in **many** sizes, they have the unqualified endorsement of hundreds of prominent forging shops.

Bulletin 360-A gives details on Universal Iron Workers. Billet Shears are described in Bulletin 3295.

BUFFALO FORGE CO.

388 Broadway **Buffalo, N. Y.**
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

Equipment for Metal Working

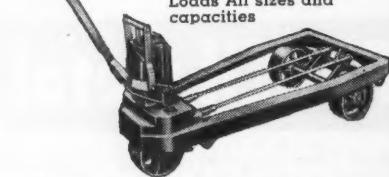
Whether it's a...

- ✓ SKID LOAD
- or a
- ✓ PALLET LOAD

You can handle it quickly, easily and cheaply with a

LYON-Raymond Hydraulic LIFT TRUCK

Platform Model for Skid Loads All sizes and capacities



Check These SUPERIOR Features

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Ask for bulletin describing these trucks—Consult us on your Material Handling Problems.

Pallet Model
4000 lb.
capacity—
for
single or
two-faced
pallets

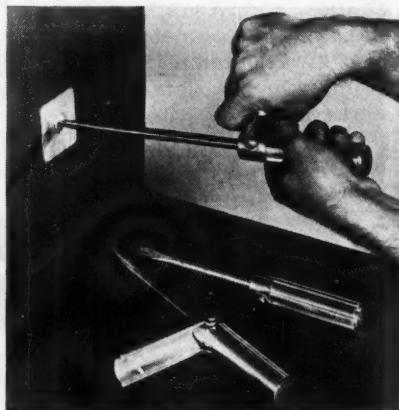


LYON-Raymond CORPORATION
492 Madison St., Greene, N. Y.

"Tuffy" Triple-Purpose Screw Driver Tool

Handy for mechanics, maintenance men, assembly line workers, engineers, and so on, a triple-purpose screw driver tool with a "power-arm" arrangement which is said to provide extra power for unlocking rusted screws is announced by the Swallow Airplane Co., Inc., Wichita, Kan. Operated in reverse, the tool, which is known as the "Tuffy," enables screws to be firmly tightened in place. With the power arm folded back into the handle, the tool becomes a standard type screw driver.

The aluminum power arm of the Tuffy



"Tuffy" Triple-Purpose Screw Driver Tool in Use

is so constructed that, when in use, it affords a solid horizontal hand support which allows for full hand and body pressure to prevent slipping or gashing of the screw head. The blade is made of drop forged steel and is plated to resist rust. The Tuffy is available in blade sizes of $5 \times \frac{1}{4}$, $6 \times \frac{1}{6}$, and $8 \times \frac{3}{8}$ inch.

Universal USP-7½ Bench Type Spot Welder

Rounding out its Universal line of 1 kva and 3 kva air-operated midget bench type spot welders, Davis & Murphy, Davis Bldg., 5252 Broadway, Chicago 46 Ill., announces the Universal USP-7½ Spot Welder illustrated herewith. Like

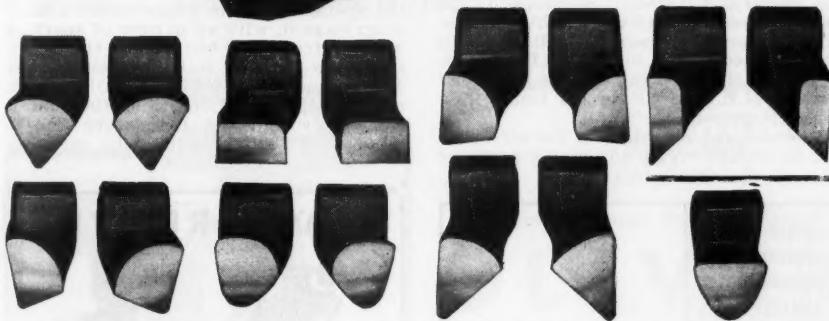
ONE OK TOOL SET

DOES MANY JOBS!



Get the most
out of your

LATHES, PLANERS
SHAPERS, BORING MILLS



OK Tool Holders and Bits are available for all machine tools on the market, in sizes and shapes to handle all single point metal cutting. The Holders are made of alloy steel, heat treated for maximum strength and toughness—will give years of service. The bits, or cutting units, are of drop-forged, best selected High Speed Steel, heat treated for maximum performance. Cast alloy and carbide-tipped bits are also supplied. In the OK Tool Holder, the bit is securely held in a serrated seat by a patented locking device. This design permits sidewise bit adjustment, which assures full, economic use of all cutting units. A single OK Tool Holder, with a set of bits, will replace many of your solid tools and do your work at higher feed cuts and speeds. And with it goes the advice of our Engineering Department and Sales Engineers.

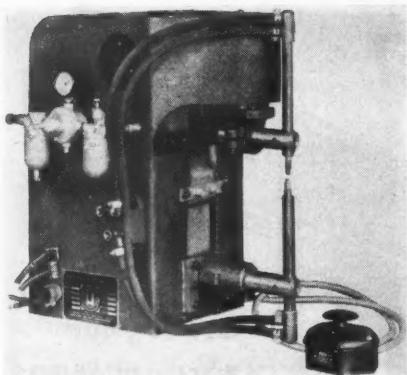


INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

MANUFACTURED ONLY BY THE OK TOOL COMPANY, SHELTON, CONN., U. S. A.

of 1
en
phy,
o 40
2-7%
Like



Universal USP-7½ Bench Type Spot Welder

the USP-1 and USP-3, it is a plug-in type and features solenoid valve control of the air cylinder, a pressure switch, and can be furnished with a built-in N.E.M.A. 1A electronic timer. It can also be furnished with a N.E.M.A. 3B or 5B timer in a separate panel.

Solenoid valve control of the air cylinder by means of an adjustable pressure

switch enables the welder to be used for welding a wide range of non-ferrous metals, wire, jewelry, and two pieces of steel up to 16 gauge. The unit is equipped with an air filter, pressure gage, and automatic lubricator. Initiation of the welding cycle is effected by an electric foot switch, the unit also being equipped with a water-cooled transformer and electrodes.

Marion Portable Bench Type Induction Heater

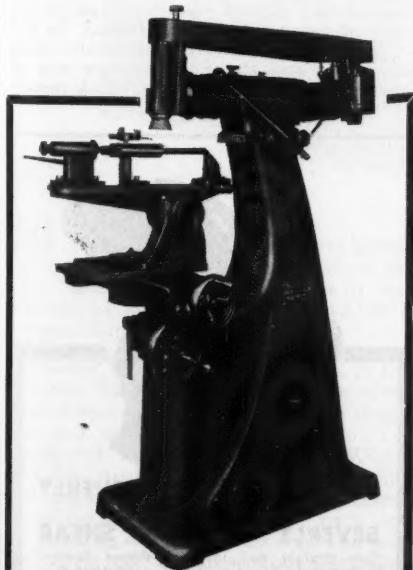
A portable bench type induction heater especially designed for the clean soldering of small parts and for the soldering of metal to metallized glass and ceramics is now being produced by the Marion Electrical Instrument Co., Manchester, N. H. According to the manufacturer, the circuit design is such that the operation of the heater offers a minimum hazard, with all danger of sparking or radio frequency burns from the output terminals or work coil being eliminated. The frequency (450 kilocycles) produces no harmful radiations, and the unit is completely shielded for safety and to meet FCC requirements with reference

LATHES MICROMILLS ATTACHMENTS COLLETS	
DERBYSHIRE <i>Fine Precision Instrument</i> LATHES	
Four Models Collet Capacity .196" to .315"	
F. W. DERBYSHIRE, INC. Waltham 54, Massachusetts	

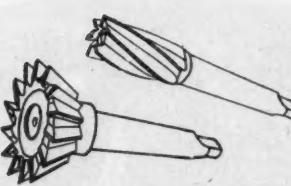
RANT 	RIVETERS
<p>Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{8}$" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.</p>	
THE GRANT MFG. & MACHINE CO. 96 Simlliman Ave. Bridgeport 5, Conn.	

CUTTERS FOR PRODUCTION

Difficult Cutters are ground easily on the ACE Cutter Grinder . . . Easy to operate the ACE keeps the work before the eyes of the operator . . . no bending . . . no squatting . . . no squinting . . . Eliminates work fatigue.



Oliver
OF ADRIAN



We recommend it for grinding face mills up to 15", slitting saws, end mills, angular cutters, slab mills, dovetail cutters, reamers, taper reamers, gear cutters, double angle cutters. Fellows helical cutters, production gashing, radial relief grinding, radius work, and newer uses found every day.

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Edges On
Our New
Treatise
on
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Grinding.

Don't Neglect
Your Toolroom
It's the Backbone
of Production!

AUTOMATIC DRILL GRINDERS—TOOL
AND CUTTER GRINDERS—DRILL
POINT THINNERS—TEMPLATE
TOOL GRINDERS—FACE MILL
GRINDERS—DIEMAKING MACHINES



Marion Portable Bench Type Induction Heater

to radio interference, it is claimed.

It is stated by the manufacturer that the safety features of the heater apply to components as well as overall design. Though all components are generously rated, the circuit has been arranged to provide adequate grounding for all elements which might be damaged by arc-over. The rectifier choke and plate cur-

rent milliammeter are both in the grounded center tap leg of the power transformer, placing them at ground potential. Extra heavy, high voltage insulation wire is used throughout, and all leads are supported—another safety factor.

Two switches constitute the controls. No tuning control is needed or used. One of the switches controls the power to the tube filaments, and constitutes a standby switch. In this condition the heater consumes only 100 watts. The other switch, also mounted on the panel, is the operating switch and controls the high voltage to the tubes. Provision has been made for operating this switch circuit by a foot treadle when desired.

Although the working efficiency will vary some depending upon the materials being heated, the circuit has been designed to provide maximum conversion of the 60-cycle power into heat. A specially designed low impedance coupling link contributes to this efficiency. Efficiency is said to be greatest when the work to be heated has a high resistivity, as in the case of ferro-magnetic materials. In the case of low resistivity materials, such as copper and silver, efficiencies are, of necessity, somewhat lower, which means

POWER HACK SAW

POWER HACK SAW

**Low Priced Self-Contained
Portable Sturdy**
Ready to Work—Economical
EXPORT DEPT.
1111 SO. FERRY BLDG.
NEW YORK 4, N.Y.
Write for Bulletin No. 300

MILLER-KNUTH MFG. CO., OMAHA, NEB.



**CUT ANY SHAPE, CLEVERLY
with a
BEVERLY Throatless SHEAR**

Cuts straight and irregular shapes faster—better! Order No. 1 for 14 ga. (with High Carbon, High Chrome Blades for 18 ga.); No. 2 for 10 ga. (with H.C.H.C. blades for 14 ga.); and No. 3 for $\frac{3}{8}$ " mild steel or 10 ga. stainless. Write for catalog!

THE BEVERLY SHEAR MFG. CO.
3004 W. 111th St., Dept. 3, Chicago 49, Ill.

This 12,500% increase sounds fantastic!



But True! . . . In crush form grinding a modified butress thread form on the new Thompson Truform Grinder it was possible to increase production 12,500% without disturbing the set-up!

The secret of this achievement lies in the fact that Thompson Truforming involves a machine engineered and built as a single unit and uses two crushing rolls . . . a "work roll" and a "reference roll." Whenever the "work roll" loses form, the original degree of accuracy is quickly transferred from the "reference roll" back into the grinding wheel and then reground into the "work roll" . . . all without disturbing the set-up.

In this way the "work roll" can be re-processed whenever it loses form and can be used for hundreds of additional dressings, or until it is worn out. In the example mentioned above, it was possible to get over 15,625 additional dressings from the

"work roll". This means an increase in continuous production of 12,500%.

So many people have asked about the details of this new Thompson process that a special 8-page leaflet has been prepared with diagrams and answers to questions about Truforming. Just write for—"Tell me about this process," Address Dept. 13.

THE THOMPSON GRINDER COMPANY
SPRINGFIELD, OHIO



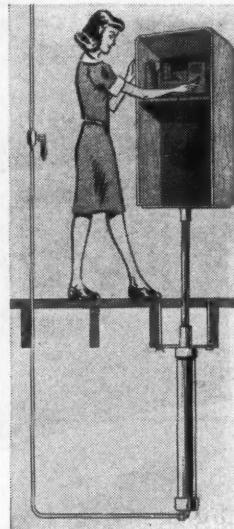
that a smaller percentage of total power is converted to useful heat.

The Marion Bench-Type Induction Heater is supplied complete with a manual which contains not only all the usual operating and service information but also provides data on the design of the work coils for fundamental shapes such as square, rectangular, round, and oval shapes. The heater is furnished in a standard relay rack cabinet, measures $15\frac{1}{4} \times 21\frac{1}{4} \times 15$ inches, and weighs 150 lb. A 115-volt, 60 cycle power supply is required, but since the input is only 775 watts, special wiring is not necessary.

Line filters are incorporated so as to eliminate danger of RF kickback in the line.

"Samson Jr." Pneumatic Lift

A pneumatic lift for use in the trimming of radio cabinets, the completion of assembly operations on small ma-



"Samson Jr." Pneumatic Lift

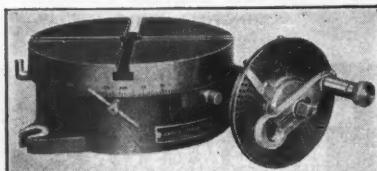
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36" x 48" . . . semi-steel . . .
accurately machined. Securely
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with adjusting screws for perfect alignment.
Shipping weight, 1300 lbs. Also larger or
smaller plates with planed or scraped surface.
We also manufacture angles and parallels as
shown underneath surface plate.
Write for details.

J. C. BUSCH CO.

Engineers and Machinists Since 1907
26 E. PITTSBURGH AVE. MILWAUKEE, WIS.



7 1/2 in. Rotary Table for Small Miller
Tables

Send for circular.

STEVENS ROTARY TABLE DIAL INDEXING TYPE

Table graduated for single degree reading.
Worm can be disengaged for turning table
by hand.

Other sizes 12", 18" and 24" diameters.

JOHN B. STEVENS INC.

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NEW YORK 13, N. Y.

TUBE BENDING and SHAPING

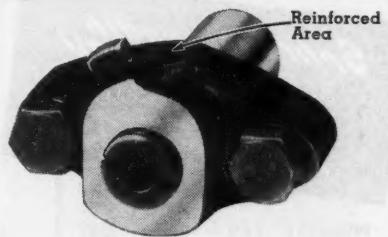
Specialists in THIN wall shaping and bending of brass, copper, steel, etc., up to 1" diameter.

Large and small quantities.

Send blue prints or samples for prices.

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AJAX FLOATING TOOL HOLDERS

In Standard or Special Sizes

No.	Shank	Hole	Price
1	5/8x1 1/4"	1 1/8"	\$6.00
2	3/4x 2"	5/8"	6.25
3	1 x2 1/2"	1 "	7.95
4	1 1/2x3"	1 "	8.65

Made of Heat-treated Alloy Steel FORGINGS, ground to Precision limits.

Dealers Inquiries Invited

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Fluid-Motion for Modern form-dressing

ONE SETTING HANDLE CONTINUOUS MOTION

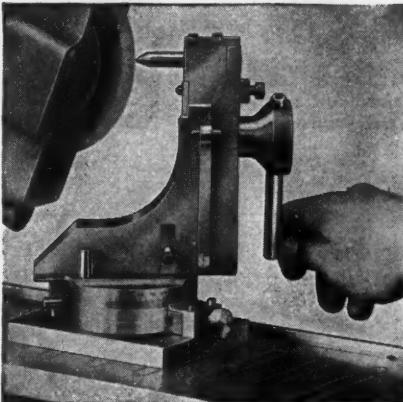
J & S Radii & Angle Dressers in the "Fluid-Motion" series are among the finest precision dressing instruments procurable . . . regardless of cost. There is a standard model to fit most form-dressing requirements.

FEATURES

- Fluid-motion dressing
- .0001" accuracy
- Automatic centering
- 7" & 14" wheel capacities
- Large range yet compact
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J. & S. TOOL CO.
477 MAIN ST. E. ORANGE 5, N. J.



SPLIT THOUSANDTH
ACCURACY
 on locating problems
with OPTICS

Whenever you bore, turn or mill to layouts, set up your job with OPTI-LOCATOR, the modern, time-saving optical tool that assures split-thousandth results before the job is commenced.

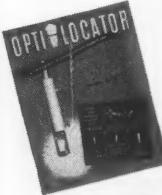
Sight OPTI-LOCATOR from a convenient position —no squinting—no eye-pieces. Use OPTI-LOCATOR on lathes, vertical and horizontal mills, jig borers, drill presses, etc. Rejects source of errors before they occur ... actually corrects for spindle runout in worn machines.

Small, simple, compact —nothing to wear out or get out of order. Assures jig-boring accuracy for

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\$24.50 complete!

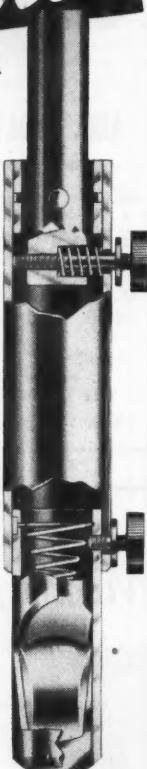
Order through any authorized distributor or write direct.



FREE BULLETIN!
 Describes OPTI-LOCATOR, accessories and applications. Send for free copy today!

THE BENTON COMPANY
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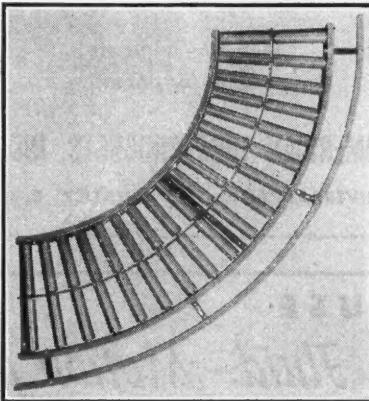
351 S. LA BREA AVE., LOS ANGELES 36, CALIF.



Designed to reduce fatigue to a minimum, the lift comprises a 4-inch diameter single-acting cylinder, on one end of which is fastened an 18-inch diameter x $\frac{1}{4}$ -inch thick revolving table. A plate is provided for fastening the cylinder to joists in the floor. A hand valve is supplied for operating the hoist, however, a foot valve for operation purposes can also be obtained on order.

Lyon Gravity Roller Conveyor

A "packaged" gravity roller conveyor for use in the handling and transportation of cartons, bales, packages, boxes,



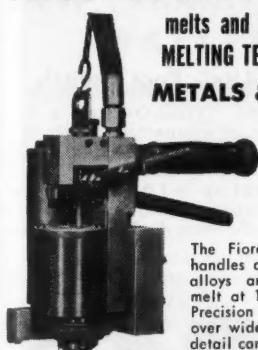
Lyon Gravity Roller Conveyor

crates, and so on, is now being marketed by Lyon Metal Products, Inc., Aurora, Ill. The conveyor is available in the following sizes: three straight sections, all 10 feet long and in three widths of 12, 18, and 24 inches; three 90-degree curved sections, 12, 18, and 24 inches wide; and two trestles, 18 and 24 inches wide. Each item is a complete unit.

Transportation on the Lyon Conveyor is by gravity—the rollers are not driven by power. The conveyor can also be employed in level sections for assembling and packaging operations. A small retainer channel directly under the top flange of the frame rails covers the ends of the roller shafts and thus provides a safety feature. The rollers are mounted on full-length shafts so as to reduce the wear on the shafts and prevent spreading of the frame, especially under im-

THIS SPRAY GUN

melts and sprays LOW
MELTING TEMPERATURE
METALS & ALLOYS



The Fiore Alloy Sprayer handles a wide range of alloys and metals that melt at 100° to 600° F. Precision control of spray over wide range. Infinite detail can be reproduced.

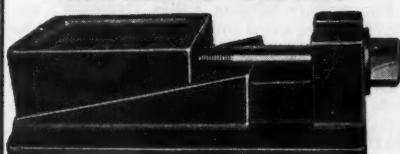
FOR: Reproducing Parts, Producing Molds for Electro Forming, Producing Molds (for Lost Wax Process), Making Dies. Also Used For: Coating Wood Patterns, Spraying Selenium Rectifier Cells, and Many Other Uses. Long, maintenance free production service one of the many features.

For complete information write to:

METALOY SPRAYER COMPANY
135 Liberty Street MS-1 New York, N. Y.

Do you want accurate work from your machines? . . . then use

LEVELING JACKS



Under the next heavy machines or any equipment you will install or re-arrange.

Leveling jacks are indispensable and a real help to your reconversion problems making re-arrangements easy and fast.

We make them in three sizes which cover the entire range of requirements.

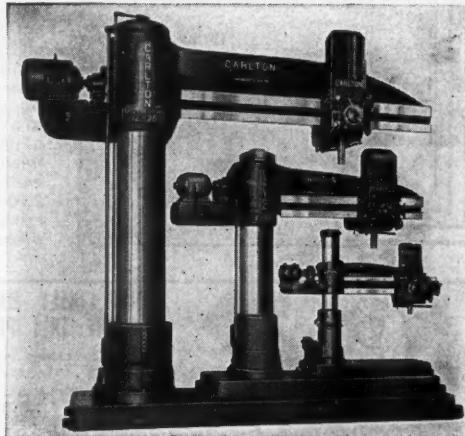
Write for descriptive literature and prices.

Jurzek Machine & Engineering Co.
326 W. Lewiston Ave., Ferndale 20, Mich.

Features:

1. All ball-bearing throughout
 2. Low-Hung Drive to Spindle
 3. Quiet running at all speeds
 4. Requires oiling only every six months
 5. Concentrated and convenient control
 6. Constructed on unit principle
- MADE IN SIZES OF
7. 3 feet to 12 feet inclusive arm lengths
 8. 9 inch to 26 inch column diameters.

CARLTON RADIAL DRILLS



THE CARLTON MACHINE TOOL CO.
CINCINNATI 25, OHIO, U. S. A.

pact loads. By setting the rollers slightly above the level of the tops of the side rails, the conveyor can be made to accommodate packages that are wider than the conveyor section itself.

The rollers of the Lyon Gravity Conveyor are spaced on 4-inch centers so as to provide for maximum support of materials being handled, and are fitted with high grade ball bearings engaged in the ends of the tube rollers by adaptors to ensure accurate alignment of the roller shafts. Light in weight, the conveyor is said to safely accommodate loads up to 200 lb. Trestle supports are carefully

designed and well braced for maximum weight, yet light enough to be easily moved about.

"Time-O-Lite" Foot Switch

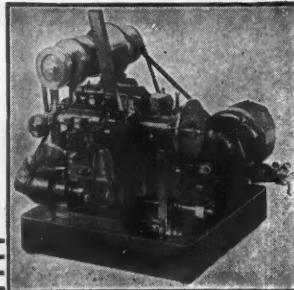
Known as the "Time-O-Lite" a foot switch for use in connection with drill presses, sanders, lathes, spot welders, jigsaw, circular saws, and other motor-driven equipment up to 1 h.p. is announced by the Industrial Timer Corp., 117 Edison Place, Newark 5, N. J. A neon

WALTHAM

Pinion and Gear Cutting Machines

with revolving cutter will make 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1½" dia. Revolving cutter makes successive cuts on blanks held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut. Write for Bulletin No. 112.

WALTHAM MACHINE WORKS
WALTHAM MASS.



"Time-O-Lite" Foot Switch

pilot light located on the foot pedal (inside the switch) provides for easy finding of the pedal in the dark, the light being not strong enough to fog photographic paper, it is claimed.

The Time-O-Lite Foot Switch is ruggedly constructed to withstand hard usage and has an attractive red and gray wrinkle finish. Equipped with a non-skid base, the unit is designed for operation on any a.c. circuit and incorporates a heavy duty snap-action single-pull double-throw switch. Silver contacts are used throughout. Two black outlets each with 1,500-watt capacity (total 3,000 watts) provide for operation of electrical equipment when the pedal is depressed. One red outlet (1,500 watt ca-



YOUR FINELY MACHINED PARTS DESERVE THIS PROTECTION . . .

Cost no more than makeshifts, when you count time lost, looking for makeshifts.

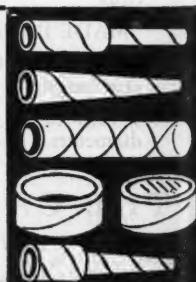
PRECISION DUST CAPS AND THREAD PROTECTORS

Tough fibre. Absolutely keep out moisture, rust, dust, grit, externally or internally. Shapes to every requirement.

Send for Bulletin and low prices.

PRECISION PAPER TUBE CO.

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Mfrs. of Paper Tubes, Bobbins, Spools, etc.



NEW PYRALIN TIPPED MALLETS



Solid, "non-sparkling, non-magnetic alloy head," threaded at both ends.

Threaded plastic tips can be screwed in by hand. Oval hole drilled in hammer head prevents handle from coming off or turning.

When buying mallets be sure to buy SOUTHWEST and get the original.

Send \$1.00 for prepaid sample mallet and name of your nearest dealer

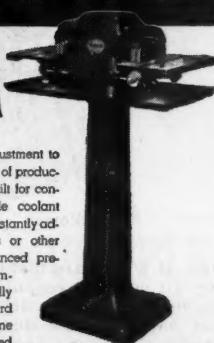
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Dept. M, P. O. Box 776, E. First St.

Tel. 5295, Santa Ana, Calif.

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GREATER
PRODUCTION
CAPACITY



Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

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BEVERLY HILLS, CALIFORNIA

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with this Brush-On Waterproofer

Just as easily as mopping a floor, you can seal roof leaks instantly and permanently with ROOFLEX. Used right from the container without heating or special preparation, ROOFLEX can be applied in any kind of weather—rain, snow, heat or cold. Here's an amazing

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"RAWHIDE PROTECTS"
CHICAGO RAWHIDE
PROTECTS MOST



Chicago Rawhide
 hammer faces of
 coiled rawhide may
 be quickly replaced
 in the permanent
 malleable iron heads.

For "soft" mallets and hammers, no other material has the *natural* protective qualities of tough, coiled rawhide. It protects finished surfaces, valuable machines and expensive dies...delivers maximum striking power and durability at the same time.

Fifty-eight years of experience in selecting, processing and seasoning mechanical rawhide is behind every Chicago Rawhide mallet and hammer. This is your assurance of a *rawhide* hammer or mallet that will stand up under severe, continuous blows—and still furnish maximum protection. Always specify *Chicago Rawhide*.

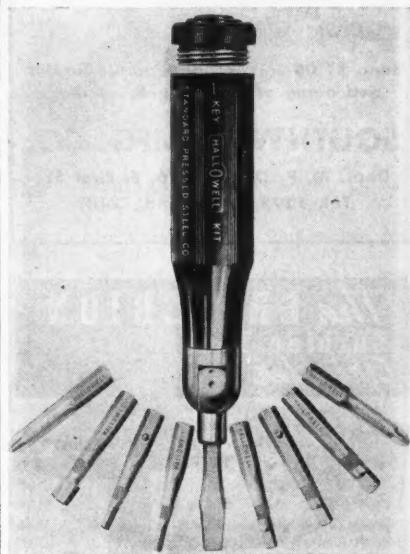
CHICAGO Rawhide MFG.CO.

1207 ELSTON AVE. • CHICAGO 22, ILLINOIS

pacity) provides for the turning off of electrical equipment when the pedal is depressed. Operation of the switch is said to be effected with a minimum of noise.

"Hallowell" Key Kit

A key kit for use in the application of a wide variety of screws, including socket set and cap, Phillips and slotted head screws, has been added to the line of "Hallowell" equipment marketed by the Standard Pressed Steel Co., Box 556, Jenkintown, Pa. Available in two sizes.



"Hallowell" Key Kit

both of which are identical in design, the key kit consists essentially of a tool that resembles a screw driver in appearance and has a hollow durable black plastic handle, forming a receptacle for the nine bits which are included with the kit.

The No. 25 size key kit contains seven hexagon, one Phillips, and one slotted screw bit. The No. 50 size kit contains six hexagon, two Phillips, and one slotted screw bit.

To use the Hallowell Key Kit, the bits are inserted in the heat-treated and

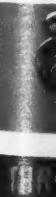
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April, 1946

piated alloy steel swivel chuck in the lower part of the handle and employed in any one of five positions into which the chuck can be snapped. The chuck also has a positive lock for the straight-line position.

Waltz Model CH Combination Heat Treating Unit

Completely equipped for heat treating all types of water or oil-hardening steel to obtain definite physical characteristics by heating, quenching, and drawing, the Waltz Model CH Combination Heat Treating Unit illustrated herewith has been brought out by the T. A. Waltz Furnace Co., 1549 Elizabeth Place, Cincinnati 29, Ohio. The unit is adaptable for use in toolrooms, tool and die shops, experimental and control laboratories, and production shops in heat treating round, flat, or odd-shaped pieces in single units or by the basketful.

The design of the unit includes a high-temperature heating furnace of the full muffle, underfired type with a separate hearth floor inside the muffle. The furnace has a range of from 1,400 to 2,350

deg. F., which is automatically controlled. In one model, the actual working space inside the muffle measures 12 inches wide x 10 inches high x 18 inches deep. A second model is available in which this space measures 10 inches wide x 8 inches high x 15 inches deep.

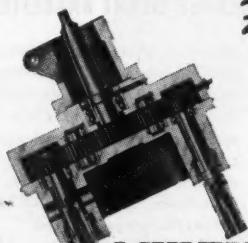
The door of the furnace is counterbalanced for ease of operation and is opened and closed by means of a foot treadle, thus allowing the operator free use of both hands for handling the work in process. A direct-connected motor-driven large-capacity blower creates combustion air within the furnace.

The Waltz Model CH Unit includes two quench tanks—one for oil and one for water. By means of double-wall construction, the oil tank is entirely surrounded by water so as to keep the oil cool and provide for uniform quenching results. Each tank is equipped with a perforated metal basket to hold quenched parts.

The tempering or drawing oven incorporated in the unit is of the recirculating type, and is designed to continually bathe the work with evenly distributed, high velocity air held to a constant temperature by automatic control. Lined with alloy steel and equipped with a per-

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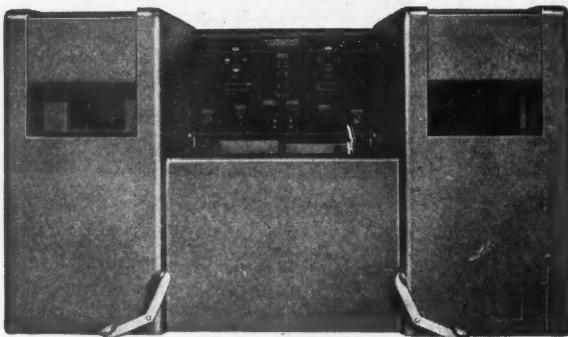
MULTIPLE SPINDLE DRILLHEADS



Detroit Representative: R. E. Parish, 3340 Fenkell Avenue

THOMSON INDUSTRIES, INC.

Waltz Model CH Combination Heat Treating Unit



forated shelf, the oven has a range of from 250 to 1,000 deg. F. Its inside dimensions are 21 inches wide x 10 inches high x 18 inches deep.

Like the heating furnace, the tempering oven is equipped with a counterbalanced door which is opened and closed by means of a foot pedal. A high velocity alloy steel fan circulates the hot gases down from the top of the oven through the work to be treated, thus causing the heat to be transferred to the work quick-

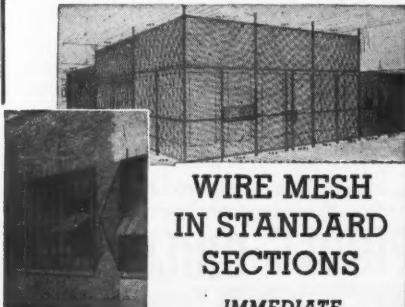
ly and uniformly. The fan is mounted on a vertical ball bearing motor.

Rounding out the construction of the Model CH is a complete instrument panel which enables the unit to be efficiently operated by means of unskilled workers.

BEX UT-30 Concentrated Washing Compound

Designed to meet aviation standards of safety, BEX UT-30 Concentrated Washing Compound now being marketed by the Gaybex Corp., P. O. Box 3, Nutley 10, N. J., is an amber liquid, which, extended with 10 to 500 parts of water, will safely and thoroughly clean any surface to which water may be applied, it is claimed. It is especially intended for

TOOL CRIBS AND PARTITIONS



WIRE MESH IN STANDARD SECTIONS

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We also make silent gears of rawhide and Fabricol.

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FEELER
GAUGE
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The COLOR
tells the
THICKNESS

Each thickness a distinctive, easy to identify color. Impervious to oil. Long lasting. 5"x20" sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together. \$3.75.

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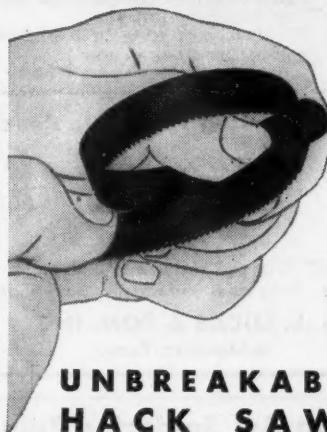
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UNBREAKABLE HACK SAWS

Spartan Flexard Hand Hack Saw Blades are ideal for use in repair and maintenance work, for they will not break in use and yet they will out-cut ordinary standard blades 3 to 1.

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industrial shop floors, engines, steam cleaners, walls, tile, office floors, desks, and so on.

Odorless, BEX UT-30 Compound, according to the manufacturer, is chemically neutral and has no adverse effect on skin, cloth, metals, or plastics. On dilution with water, it forms a stable mixture. The compound weighs approximately 8½ lb. per gallon and, if necessary, in exceptional cases, may be used in concentrated form without risk, it is stated. Exact dilutions for each use may be found by experimentation.

BEX UT-30 is available in 5 and 54-gallon (non-returnable) drums.

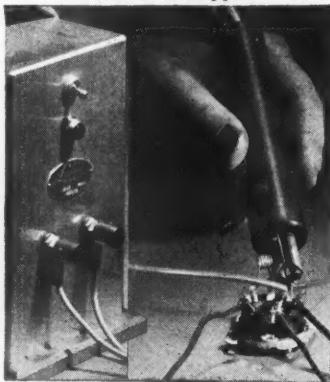
New Nesting Type Tote Pans



20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.
Bridgeport, Conn.

Luma Arc Soldering Tool Resistance Type

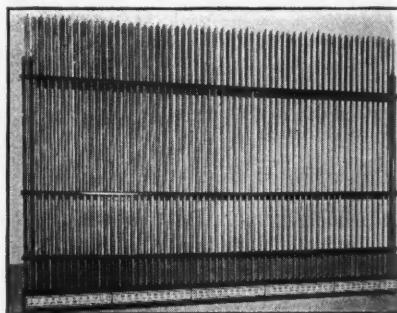


For practically all soldering jobs. Large pieces—terminals—harnessed assemblies. High production, low maintenance. Localized heat at point of application. Safe and convenient to operate. Write for details.

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Drill Rod Rack

A rack for holding from 8 to 10 drill rods varying in length from 3 to 36 inches is now being marketed by the Grinding Supply Co., 415 S. Western Ave., Chicago 12, Illinois.



Drill Rod Rack

Durably made so as to afford long life, the rack is indexed in numbers and decimals for drill rods from Nos. 1 to 60 inclusive. The rack is so constructed that it can be readily hung on the wall of a toolroom or machine shop where it will be possible to tell at a glance which sizes of drill rods have to be replenished, as well as serving as a storage unit for random drill rod lengths.

Monroe Millgrinder

An oscillating surface grinder for production as well as toolroom work, to be known as the Monroe Millgrinder, has been developed by the Monroe Tool and

Just the MAGNIFIER You Need

For that Precision Work. Combines Quality, Compactness and Durability. Adaptable to any purpose.

Ask your Dealer.



ARROW-STAR MFG. CO.
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**BENDS PIPE EASILY and
QUICKLY INTO ALL SHAPES**

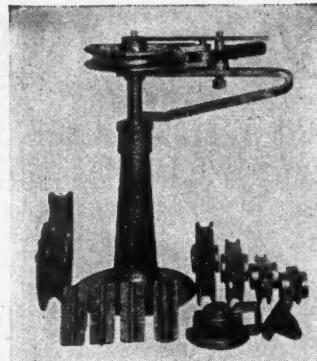
"American"

Cold Pipe, Conduit and Tube Bending Machines

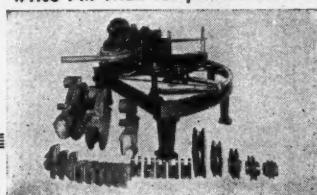
Twelve types to select from. Hand operated capacities $\frac{1}{4}$ to 6" inclusive. Motor operated $\frac{1}{2}$ to 8" inclusive.

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WORKBENCHES OF STEEL



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Pat'd. & Pats. Pend.
Drawer is extra.

Once you decide to use "Hollowell" Workbenches of Steel, you're done with waiting. No more waiting for materials, for carpenters, for the actual building of the benches. Just choose what you want from over 1300 ready-made combinations available. Sturdy and dependable, these benches are built for lifetimes of wear. Don't wait even now . . . write today for the free "Hollowell" Catalog. "Unbrako" and "Hollowell" products are sold entirely through distributors.

See our exhibit in Booths 326-328, at the A.S.T.E. New Era Exposition in Cleveland, April 8-12.

OVER 43 YEARS IN BUSINESS

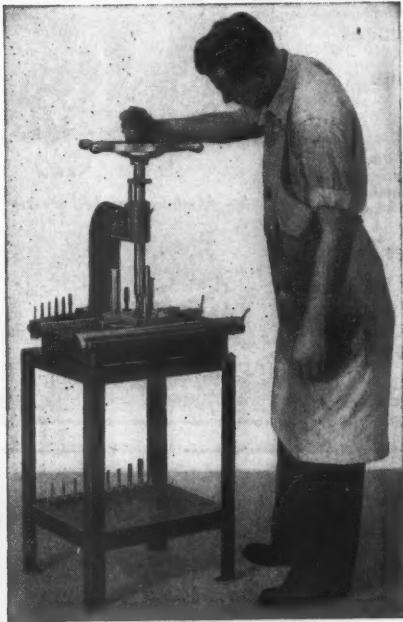
STANDARD PRESSED STEEL CO.



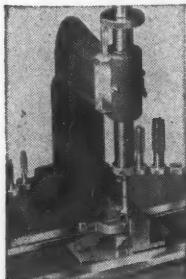
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AND THREADER (Single Spindle)
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Taps twice as many holes, quicker than with a tap wrench. Always right angle holes. Tap capacity $\frac{1}{8}$ " thru 1".



STEPPED HOLDING BARS

Replace Vise, hold work firmly — prevent tap-breaking torque.

TAP ADAPTERS

No extra spindles needed. Change taps in a jiffy.

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Always show depth tap has travelled.

Immediate Delivery.
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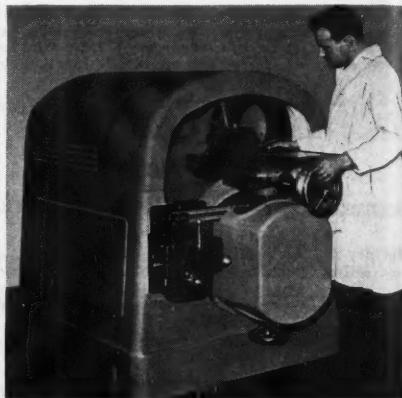
LASSY TOOL COMPANY

PLAINVILLE, CONN.

*Patents Pending

Manufacturing Co., 2006 N. Dixie Highway, Monroe, Mich. In toolroom work, the machine can be used in squaring up material for jigs, dies, or fixtures and layout operations. The design provides for simplicity of operation and rugged construction together with the need of minimum floor space and ease of setup.

The oscillation movement is produced through a standard oscillating system governing the position of the arc of oscillation as well as the speed in the oscillation. The oscillating unit is driven by a 3 h.p. motor. The grinding wheel is of standard make and is driven by a 10 h.p. motor equipped with oversized Timken



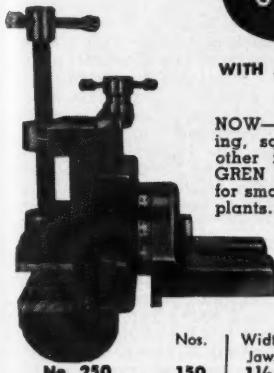
Monroe Millgrinder

bearings and an oversize shaft measuring $2\frac{1}{4}$ inches in diameter.

Capable of withstanding continuous hard usage, the Monroe Millgrinder is equipped with a 45-gallon coolant tank providing ample cooling facilities for steady runs and featuring a by-pass valve which enables the machine to be cleaned by simply turning the valve and by-passing the solution from the tank in approximately 3 minutes.

"Feedrail" for Machine Tools

Known as the "Feedrail," a system of enclosed electric rails and trolleys for portable motors, lights, and other moving electrical equipment is now being offered by the Feedrail Corp., 125 Barclay St., New York 7, N. Y. As applied to machine tools, being approximately $3\frac{1}{2}$



MILL IT
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WITH A

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MILLING ATTACHMENT

NOW—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has 360° graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

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No. 250	1 1/2"	1"	1 1/8"	6 1/2	1"	\$18.75
150	1 1/2"	1"	1 1/8"	6 1/2	1"	24.75
250	2 1/2"	1 1/8"	2 1/2"	11	1 1/4"	39.75
400	4"	1 1/2"	4"	25	2"	

Order from your dealer or jobber. Write for circular No. 350.

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Mfrs. of PALMGREN PRODUCTS for over 28 Years
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THE "FORM - MASTER"

ANGLE and RADIUS DRESSER

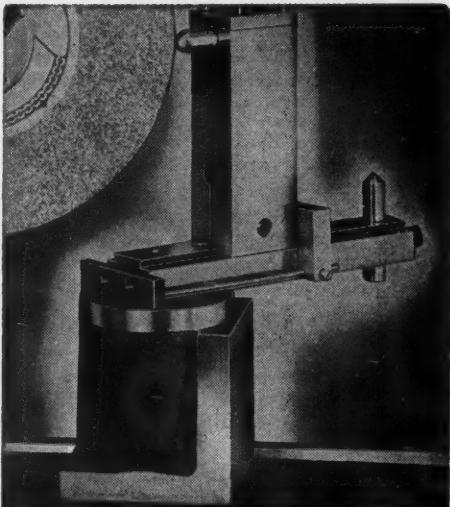
A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two $\frac{1}{3}$ ct. diamonds and instrument case included—\$150.00 complete.

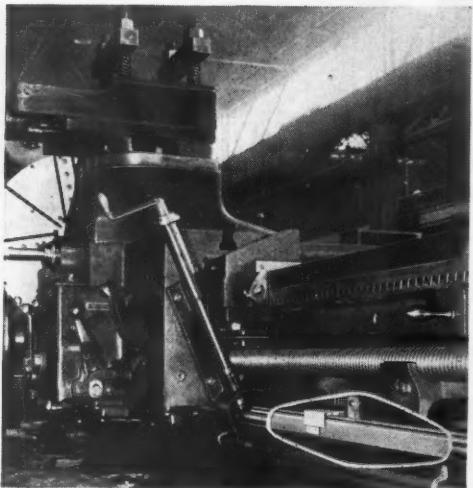
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- .0001" accuracy obtainable
- Simple to operate
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Call your supplier or write

J. & S. TOOL CO.
477 Main St., E. Orange 5, N. J.





View of machine tool with part of control rod cut away to show "Feedrail"

x 3½ inches in size, the Feedrail is mounted close to the machine bed and furnishes electrification at the moving carriages for grinders, lights, or for transverse power.

According to the manufacturer, the design of the Feedrail provides for the elimination of dragging or bending rods, exposed trolleys, and poor contacts. Contact is made by rollers moving along heavy and durable bus bars that are totally enclosed. The Feedrail is arranged to feed a trolley that operates inside a duct which affords complete protection from foreign matter coming in contact with the live or movable parts.

Constructed of heavy gauge steel and rugged parts to eliminate wear and early replacements, the Feedrail is said to operate equally well in both a horizontal and vertical position. Curved track can be used successfully for circular machines and conveyors, it is claimed. Furnished in factory assembly section, the Feedrail is ready to be bolted together to form any length desired.

The Feedrail "100" is designed for service up to 100 amperes and 575 volts,

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When war came PATTERN MOLD served in many war plants, U. S. Navy Yards and Wright Field where it was used for gages in the Inspection Division.

Wright Field: "Pattern Mold was selected for this purpose (template gages) in view of the accuracy at which these molds can be maintained relative to the size of the master used for molding and the ease of production and can be produced a great deal cheaper than steel gages which would be especially difficult to produce and duplicate within the degree of accuracy required."

Now it is available for reconversion operations.

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These prices are F.O.B. Cleveland and include the necessary quantity of Liquid Binder.

W. B. BURKE & CO.,

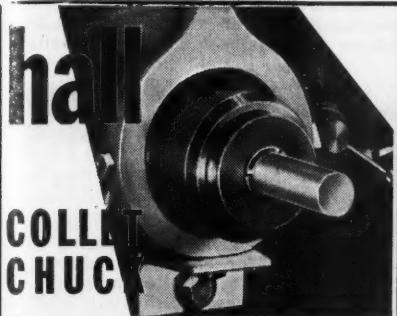
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(When 100 lbs. of Pattern Mold are ordered you receive a total of 140 lbs. of material).

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SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only \$145

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Round, square or hex collets, plain—serrated
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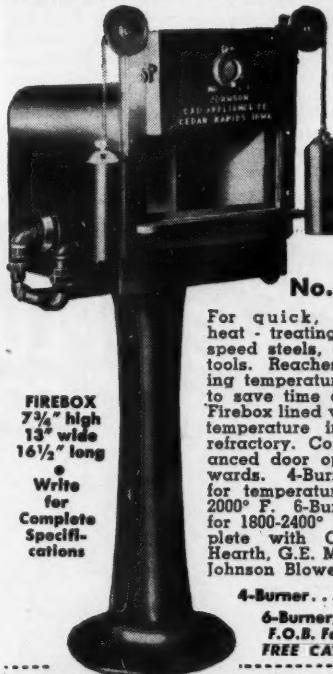


April, 1946

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AT THE TOOL SHOW!**



BOOTH 1417
CLEVELAND • APRIL 8 - 12



No. 130A

For quick, accurate heat-treating high-speed steels, dies and tools. Reaches operating temperatures FAST to save time and gas. Firebox lined with high temperature insulating refractory. Counterbalanced door opens upwards. 4-Burner Unit for temperatures 1400-2000° F. 6-Burner Unit for 1800-2400° F. Complete with Carbofrax Hearth, G.E. Motor and Johnson Blower.

4-Burner... \$295

6-Burner, \$325

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a.c. or 250 volts, d.c. The Feedrail "60" is suitable for lighter machines and is available in a two or three-pole 60-ampere capacity for 250 volts, a.c. or d.c. Special systems for service up to 500 amperes, 575 volts and multiple Feedrail may be built to order to meet other requirements.

Van Keuren Carboloy Wire Type Plug Gages and Thread Measuring Wires

The Van Keuren Co., 177 Waltham St., Boston 72, Mass., announces the addition of Carboloy wire plug gages and thread measuring wires to its line of precision gages. The plug gages are available in diameters from 0.020 to $\frac{1}{4}$ inch. The gaging units are made in lengths of $1\frac{1}{8}$ inches for diameters up to and including 0.100 inch and in 2-inch lengths for diameters above 0.100 inch. They are made to a Class B tolerance of ± 0.000025 inch or in coarser or finer tolerances as may be required. The gaging unit is held in an aluminum handle by means of a split brass bushing and a socket set screw.

The Carboloy wire type plug gages are recommended for checking small holes where the production runs are long or



Van Keuren Carboloy Wire Type Plug Gage

the material to be gaged is extremely abrasive. The Carboloy measuring wires are intended for checking National 60 threads from 6 to 28 pitch and, like the plug gages, possess unusual wearing qualities.

Potter Dual Predetermined Electronic Counter

A dual predetermined electronic counter for use in slide fastener manufacture, the counting and packaging of small items, and in rolling mills has been announced by the Potter Instrument Co., 136 Roosevelt Ave., Flushing, N. Y. The instrument utilizes four standard Potter four-tube counter-decade circuits, the

**BUILT IN CUTTING-OFF TOOL
GIVES PLUS VALUE TO
COLWELL TURRETS**



When a job calls for two or three tool changes and a cutting-off operation, use a Colwell turret. For on Colwell turrets, a standard cutting-off tool, beveled on both sides so that it clears itself, is mounted directly in the turret, without the use of a toolholder. Saves you the time and trouble of grinding down a square tool bit. Write today for our new folder.

S.G. COLWELL 25 Congress Ave., Prov., R.I.

ROGERS

PATENT ADJUSTABLE HOLLOW MILLING TOOL

Quickly and easily adjusted—rugged in construction—rigidly locked when on the job.

Carbide tipped blades optional, are quickly interchanged with the high speed steel blades, for cutting the harder or gritty materials.

These adjustable hollow milling tools are designed and built to the ROGERS quality standard since 1890.

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**THE JOHN M. ROGERS
TOOL CORP.**

Gloucester City

New Jersey



COMET

BORING, FACING and INTERNAL THREADING TOOLS

For holes from $\frac{1}{8}$ " upward, 15 different sizes.

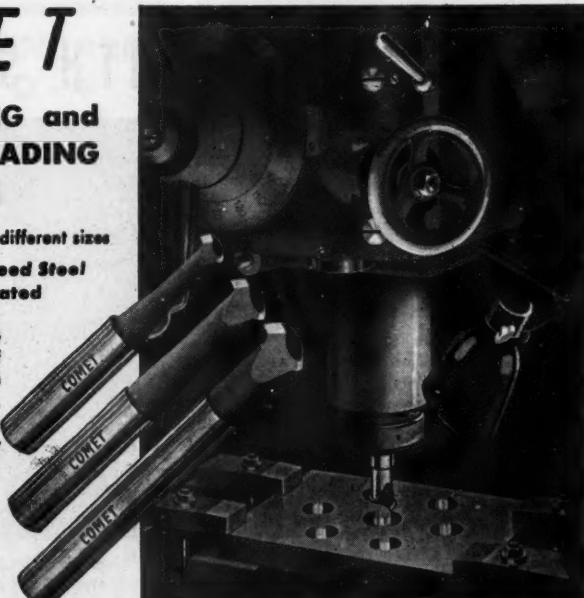
Made of Super-High-Speed Steel
Specially Heat Treated

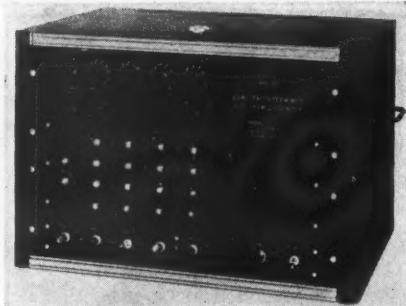
Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long, useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

Write for complete data.

COMET TOOL CO.

738 Broadway, New York, N. Y.





Potter Dual Predetermined Electronic Counter

decades being arranged to provide two independent predetermining channels in which any number from 0 to 10,000 may be initially set up by simply manipulating rotary switches mounted on the front panel of the unit.

During the operation of the equipment, each channel is alternately preset to the desired predetermined number. This function is accomplished automatically by self-contained circuits and is said to be effected in less than one millisecond. The

input is arranged for operation with either make-contacts or with sharp negative pulses, as specified. Input frequencies may be in excess of 1,000 cycles per second. The output consists of an ultra high speed relay with single-pole double-throw contacts. This relay is energized at the end of one predetermined count cycle and is said to remain energized throughout the other predetermined count cycle.

Designed to meet the rigid requirements of industry and having components which have been carefully selected for conservative operation, the Potter Dual Predetermined Electronic Counter is constructed for use in connection with a 110-volt 60-cycle circuit and is available for any specified total count with either single or dual predetermining channels.

Redmer No. 10 Collet Air Chuck

The Redmer Air Devices Corp., 601 W. Washington Blvd., Chicago 6, Ill., announces a new size collet air chuck designated as the No. 10. This chuck is of the same size as the present No. 00 chuck but is designed to utilize No. 10 collets, the same as used on Brown & Sharpe high

SAVE HANDS WITH STRANDS ENCLOSURE SAFGUARD

and Increase Production

Made for blanking, piercing,
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automatic feeds.

Adjustable to all sizes of dies.
Gates can be tilted inward close
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up or down to straddle any
obstruction.

Transparent Shields made for
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STRAND MFG. CO., INC.

SAFETY ENGINEERS

611 West Lake Street Chicago 6, Ill.



SEND FOR CIRCULARS ON STRAND
ENCLOSURE AND SWEEP SAFGUARDS

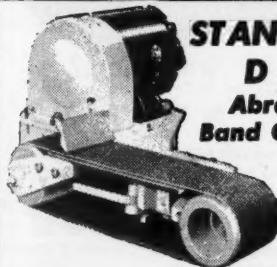
Why THOR STAMPS Last Longer



... because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

You get more mark per dollar with THOR STAMPS. Write for catalog and prices.

The Pittsburgh Stamp Co., Inc.
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STANDARD
D - 4
Abrasive
Band Grinder

Famous
for
Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre... at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 $\frac{1}{4}$ " band. The ideal portable unit.

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MANUAL ON FINISHING—WRITE TODAY

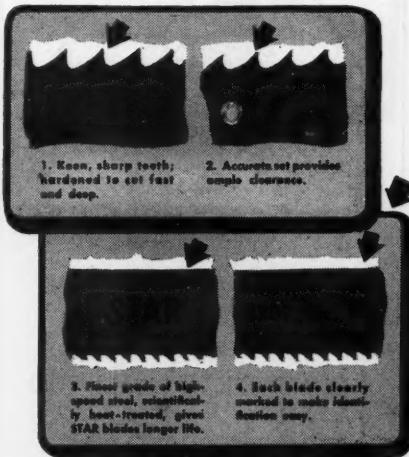
WALLS SALES CORP.
96 Warren St., New York, N. Y.

To: Hack saw users A WORD OF ADVICE



FREE — STAR Metal Cutting handbook gives valuable instructions on selection, use, and care of hack saw blades.

Buy STAR Blades
FOR
faster cutting
FOR
cleaner surface
AND
they last longer
HERE'S WHY



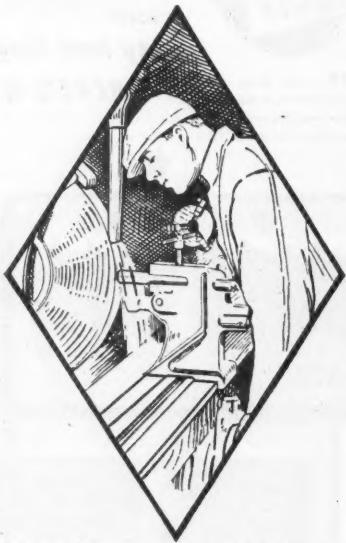
**SOLD THROUGH
LEADING DISTRIBUTORS**

CLEMSON

CLEMSON BROS., Inc., Middletown, N. Y.
Makers of hand and power hack saw blades
frames, metal cutting band saw blades and
the Clemson D-17 lawn machine

More Wheel Truings Per Dollar!

The real value in a diamond is determined by the number of truings obtained per dollar invested.



**GILMORE DIAMOND
TOOLS** are designed and priced to reduce the cost per dressing.

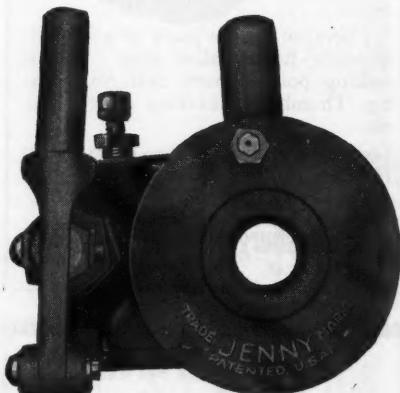
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F. F. GILMORE & CO.
285 Columbus Ave.
Boston 16, Mass.

speed automatics. The No. 10 collets have a size range from $\frac{1}{8}$ to $\frac{1}{2}$ inch. By the use of an adaptor sleeve and nose cap, the No. 10 chuck can be made to accommodate regular No. 00 collets.

"Jenny" Center Hole Hydraulic Puller

Known as the "Jenny," a center hole hydraulic puller for use in the pulling of axles, axle tubes, fan hubs, bushings, cylinder liners, pistons, wrist pins, valve



"Jenny" Center Hole Hydraulic Puller

seats, keys, wheel sprockets, gears, boiler tubes, and so on, is now being marketed by William S. Pine, 201 Pine Bldg., 1635-39 E. 22nd St., Los Angeles 11, Calif. The puller can also be used as an ordinary hydraulic jack or readily rigged up as a portable press.

Light in weight and one-man operated, the Jenny is quickly portable to any location desired and is made of heat-treated alloy steel to withstand heavy loads and service abuse. Factory tested to a 50 per cent overload, the puller is available in five models ranging in capacity from 30 to 100 tons and weighing from 32 to 92 pounds.

"Budgit" Gantry "A" Frame

The Shaw-Box Crane & Hoist Divisions of Manning, Maxwell, & Moore, Muskegon, Mich., have placed on the market a

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REQUEST NEW ILLUSTRATED BULLETIN 41

In sizes up to 124 lb. and with numerous Attachments, this vise is a ready-made jig or fixture for plain or special holding and repeat-operation work.

GRAHAM MULTI-PURPOSE VISE

6", 9" and
12" JAWS



Sold plain
or with
jig
attachments

KNURL HOLDER FITTING LATHE TURRET



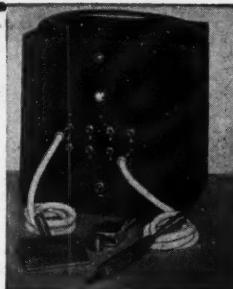
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USING ONLY
STRAIGHT KNUURLS,
cuts wide variety of
straight, spiral and
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work up to 2½" dia.

Request New Illustrated "Bulletin 41"

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MARK IRON, STEEL and CARBIDES



THE *Echograph* Mark WAY

Original Electric Etcher. Thousands in Daily Use

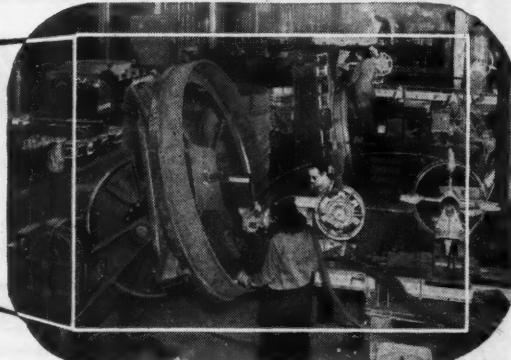
Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements.

• Write for circulars and prices.

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Hudson Terminal Bldg. New York 7, N. Y.

Setting new standards in production welding



Matching their important contribution to faster production welding for war, C-F Welding Positioners are setting new standards in post-war welding practice. Shops already equipped with C-F Positioners are pacing the field in the race for new markets.

Equipped with variable speed control in any practical speed ratio, from 0 RPM and up, for handling circular or peripheral welds, C-F Positioners are speeding production welding practices everywhere. Speed selection is fast, easily made, permitting quick change-over of material being welded.

C-F Positioners as production tools are changing

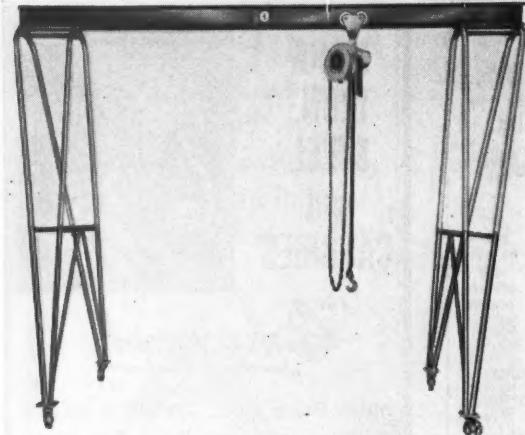
welding practice from slow, costly operations to faster, better automatic downhand welding. Cost of welding footage is reduced, "overwelding" is eliminated and machine or operator capacity is materially increased. There are hand or power operated C-F Welding Positioners in capacities from 1200 to 30,000 lbs. Write for illustrated bulletin WP 22. CULLEN-FRIESTEDT COMPANY, 1311 South Kilbourn Ave., Chicago 23, Ill.



positioned welds
mean better, more
economical welds

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

"Budgit" Gantry "A" Frame



mobile load handling device of 2,000-lb. capacity which provides a complete load handling unit that is designed for operation on the floor. Marketed under the trade name of "Budgit" Gantry "A" Frame, the device is available as a complete unit as shown in the accompanying

illustration or as an assembly which includes all parts necessary to build the Budgit Gantry A Frame except the I-beam which may be obtained locally.

When purchased as an assembly, the Budgit Gantry A Frame may be completed in one hour, the manufacturer states. The design is such that the I-beam may be mounted on top of the gantry legs or suspended from them. The legs are formed from steel pipe welded into rigid one-piece units and mounted on heavy duty industrial casters equipped with anti-friction bearings and ball bearing thrusts to ensure easy movement and free swiveling.

The complete assembly weighs 270 lb. and is arranged so that the entire space between the gantry legs may be served since the inside faces of the legs are vertical their entire height. The principal dimensions of the completed Budgit

MACHINE BASES

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Cincinnati 2, Ohio

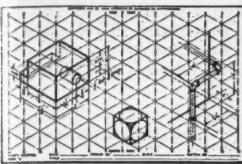


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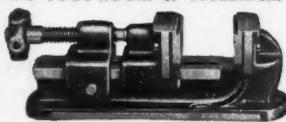
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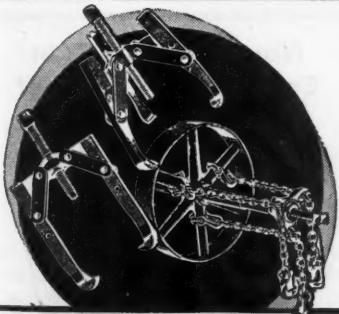
Wade Instrument Co. 1422 E. 109th St.,
Dept. H, Cleveland, O.

GEM MACHINE VISES For TOOL-ROOM or Production.



Six sizes, 3" to 12". Many exclusive features.
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ARMSTRONG-BRAY GEAR and WHEEL PULLERS Essential Tools Prompt Shipment

because they save hours of time, prevent costly breakage and long shut downs.

STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not slip from work. Arms are forged and heat-treated. 2-arm, 3-arm and special designs. 34 types and sizes. CHAINGRIP Universal Pullers pull wheels, solid gears, pinions, etc., even at considerable distance from end of shaft. Proof-tested chains have both chain hooks and special pulley hooks. 3-ton and 12-ton capacities. Write for Catalog Sheets.

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5346 Northwest Highway Chicago 30, U.S.A.



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PHONE ANY OF THESE DoALL STORES

Gantry A Frame with the I-beam mounted on top of the legs are: overall height, 10 feet; clear space beneath the I-beam, 9 feet 6 inches; clear space the entire height between the insides of the legs, 9 feet 4 $\frac{1}{2}$ inches; width at floor, 5 feet 4 inches, and length, 12 feet 6 inches.

The Budgit Gantry A Frame is designed so that either a chain block or electric hoist may be suspended from an I-beam trolley and employed as the lifting means.

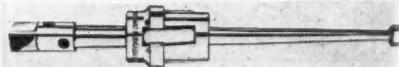
Dudgeon Model 16 Tube Expander

A tube expander for general boiler work, railroad maintenance, boiler making and boiler repair is now being manufactured by Richard Dudgeon, Inc., 24 Columbia St., New York 2, N. Y. Designated as the Model 16, the unit is simply designed, consisting of a frame, set of rolls, and mandrel. When necessary, the expander may be readily dismantled and new rolls quickly inserted.

The frame holding the rolls is a single piece of heat-treated steel, hardened and tempered for toughness and durability. The rolls are extra long and reversible

for double length of service and are set at an angle with the mandrel for self feed. Reversing the mandrel releases the expander from the tube.

The Dudgeon Model 16 Tube Expander



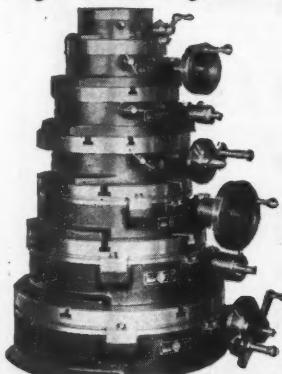
Dudgeon Model 16 Tube Expander

is compactly constructed, thus permitting it to be used close to the boiler shell, rivet lines, or tubes grouped together. The expander is furnished for hand or combination hand and power use.

Klay Wheel and Gear Puller

The Scott and Ewing Co., Dept. M-4, Findlay, Ohio, is now marketing a wheel and gear puller in which the pulling and gripping actions are independent of each other, thus allowing for the development of an unusually great pulling power together with a safe and positive grip on the object being pulled, it is claimed. Designated as the Klay, the puller in-

Troyke Rotary Tables



Sizes 9", 12", 15", 18", 21", 25"
Ask your dealer or write us for
eight page catalog.

ALFRED A. TROYKE
4422 Appleton St. Cincinnati, Ohio

Now IN STOCK in
Carbon or H.S. Steel

REED STANDARD KNURLS

MORE THAN 100
STYLES and SIZES
AVAILABLE



SPECIAL KNURLS

for any knurling
requirement made
to blue print or
specifications.

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WORCESTER, MASSACHUSETTS

PRECISION
For high speed
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Rebates. 50
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April, 1



PRECISION "BORING" TOOLS

For high speed finishing to extremely close tolerances and "mirror-like" finishes. Stocked in "master" styles, ready to grind to suit. Priced as low as 65¢ each.

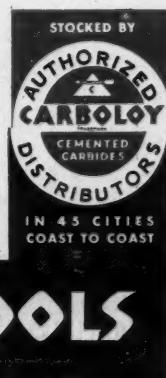
FOR ROLLER TURNERS

Full line of "boss" tools for W & S, Gibbs, and L & S machines. All types uniform, smooth size and finish, fast stock removed, entire long tool life.

For maximum savings from carbide tool use, don't overlook these "special-purpose" standards. They're designed to give you the same top-quality results at the same low cost as Carboloy's well known standards for general purpose turning, facing, boring.

It pays to specify Carboloy "Standards." They're quantity-produced at economy prices . . . planned to provide for diversified use from minimum inventories . . . quickly available from local stocks in 45 cities, coast to coast. Write for Catalog GT-175R.

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Standard **CARBOLY** (TRADEMARK) CEMENTED CARBIDE **TOOLS**

Gear and PRECISION UNIFORMITY



THREAD GRINDING. One of many units of Abart's complete equipment.

Abart Quality GEARS

No stocks, all gears precision cut to your specifications on any quantity, large or small. Spur, bevel, worms, helical and spiral, internal, sprockets, finished machine racks. Wire or write.

Also mfrs. of Abart Speed Reducers.

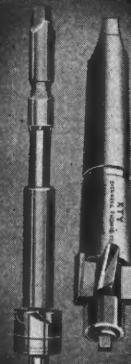
Abart

GEAR AND MACHINE CO.
MANUFACTURERS OF
Speed Reducers & Gears
4819 WEST 10th ST., CHICAGO 5, ILLINOIS

High Speed COUNTERBORES

BACK
SPOT
FACERS

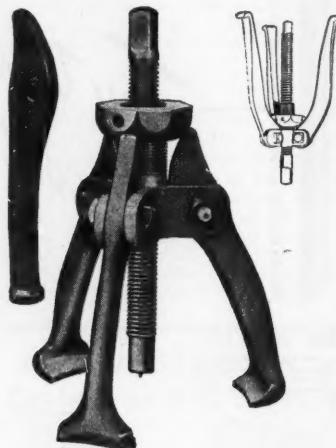
Interchangeable
Catalog
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Request



BICKNELL-THOMAS COMPANY
Greenfield Massachusetts

corporates a lock nut which permits the hooks to be firmly locked to the gear or wheel so that they will not slip off and which enables the grip to be equally applied on all sides. Thus, the total force developed by the pulling screw is said to be directed toward removing the wheel instead of part of it being diverted into gripping power.

Claimed to be foolproof in operation, the Klay Puller, in addition to regular straight and curved hooks, may be obtained with special hooks which are interchangeable for specific applications, including expansion hooks which func-



Klay Wheel and Gear Puller

tion just the opposite from regular hooks in that they are used in pulling from the inside. The puller is made in two and three-hook types for removing parts ranging from $\frac{5}{8}$ -inch gear up to a 40-inch wheel or hub.

Harmon Eder-Lite Miniature Inspection Lamp

A miniature inspection lamp, the Eder-Lite, now makes it possible for inspectors, engineers, mechanics, scientists, and others whose work requires the inspection of hard-to-get-at places to light up and visually inspect cylinders, gear housings, tubes, rifle barrels, pipes, and other equipment that has openings as small as $5/16$ of an inch and recessing

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PUNCHES and DIES TO FIT ALL MAKES OF PUNCH MACHINES

Large range of round, square,
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in stock for immediate shipment.
Special Tools Made To Order.

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T. H. Lewthwaite Mach. Co.
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GEARS GOOD GEARS ONLY

All Kinds—Any Quantity
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THE CINCINNATI GEAR CO.
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GRAVITY FEED OILING



... with NEEDLE VALVE ADJUSTMENT and SHUT-OFF

Available in several models, and with either glass or unbreakable reservoir, the Gits sight Gravity Feed Oiler permits flow of oil to bearing to be varied as desired by the simple turning of a knurled screw—or completely shut off during idle machine periods. These oilers are particularly adapted to applications of excessive vibration. The styles equipped with unbreakable reservoirs are widely used in the food processing and similar industries. Range of sizes, models and prices furnished on request.

Do you have a copy of the Gits Catalog No. 60 — write for it.

GITS BROS. MFG. CO.
1845 South Kilbourn Avenue • Chicago 23, Illinois

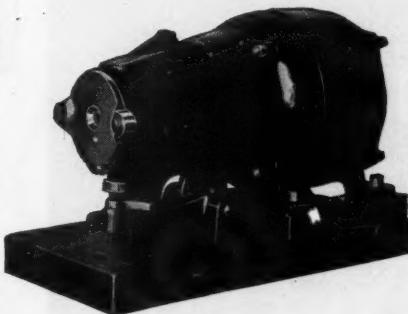
Exclusive for over 35 years

ZIP ... and It's Done

Yes, zip, it's done—that's how the Weber Perfection Wire Stripper removes insulation from the ends of solid, stranded or multi-conductor cable and wire. Takes any size up to half-inch diameter.

It's a Precision Stripper ruggedly built—and so simple your most unskilled employee can operate it. Get your wire stripping done quicker, better, save money, speed up production.

Your first step is to write for information.



**Perfection
Wire Stripper**

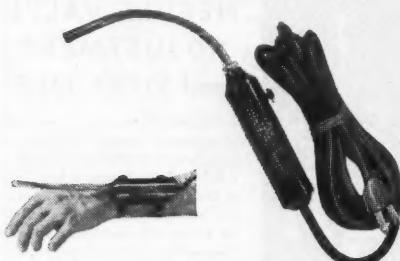
WEBER MACHINE CORPORATION

59 Rutter St.

Rochester 6, N. Y.

interiors. The lamp is a product of Harmon and Company, 6 N. Michigan Ave., Chicago 2, Illinois.

Small light reflecting and glareless



Harmon Eder-Lite

metal protected tungsten bulbs attached to flexible or rigid extension make clear vision possible by literally steering the bulbs down the proper channels so that a maximum amount of light is focused on the proper place. Current is supplied through a rubber insulated wire cable to a transformer enclosed in a bakelite handle, protecting the user against shock.

ST. LOUIS GEAR CO.
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FINE PITCH GEARS
Cut to order

Also, in fields where there is danger of explosion or fire, the Eder-Lite can be obtained in a special model to provide complete safety in this type of work.

The standard Eder-Lite set is supplied in an attractive velvet lined leatherette case and consists of a built-in push-type transformer lamp handle constructed for a.c., a 10-foot plug-in cord, two rigid and two flexible extensions of varying length that can be used in combination or separately, and four screw-in miniature tungsten bulbs of varying sizes. Additional extensions are available in lengths up to 32 inches in flexible, semi-rigid, rigid, and rigid angle construction. Special lamps, cord lengths, and mounting or hand brackets may be obtained. In addition, a small, attachable reflecting mirror, similar to a dentist's mirror, is available for the inspection of areas not in a direct line of vision.

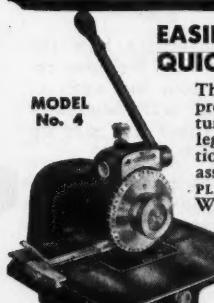
Barnaby "Jam-Proof" Non-Releasing Tap Holder

A draw-out style tap holder of rugged construction which is said to monitor the severest tapping operations without sticking or jamming, to be known as the

CLEAR-CONCISE NAMEPLATE MARKING

EASILY—
QUICKLY!

MODEL
No. 4



The nameplate on your product is your signature; keep it neat and legible! Accurate location and alignment are assured with this NAMEPLATE DETAIL PRESS. Write for particulars.

- Simple Operation
- Perfect Alignment
- Uniform Depth

Designed & built by

GEO. T. SCHMIDT, INC.

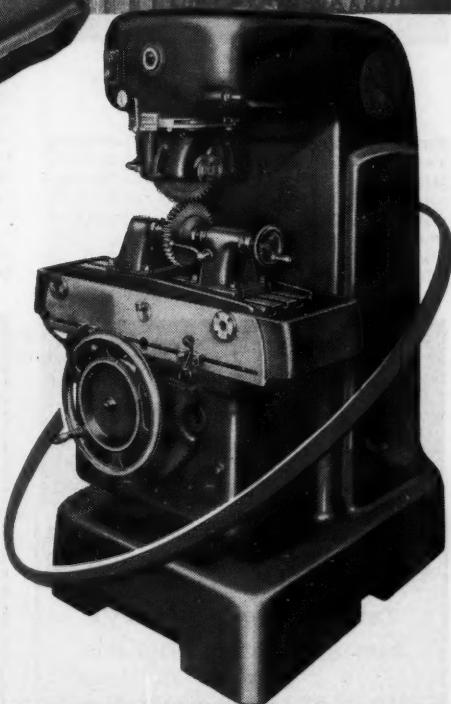
1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS



Gears requiring 40 minutes (floor to floor) for grinding are being shaved in just 5 minutes.

The shaved gears are just as accurate dimensionally as the ground gears; tooth surfaces are just as smooth and of equal if not greater importance, the shaved gear teeth are entirely free of those prevalent hairline grinding cracks which so often result in fatigue failures. Thus by shaving you get better gears faster and at less production cost.

Gears are shaved on Red Ring Rotary Shaving Machines which produce smooth tooth surfaces and correct errors of helical angle, profile and eccentricity. Gears from $3/16$ " to 220 " P. D. can be shaved. Those from $3/8$ " to 36 " P. D. can also be crowned to avoid the danger of failure due to "End Bearing."



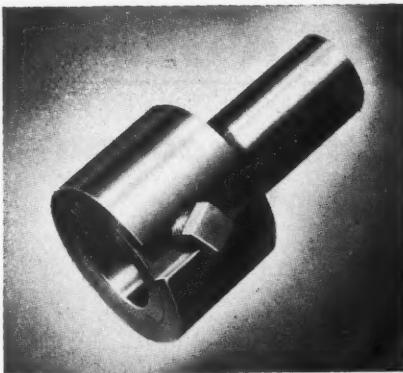
NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

5600 ST. JEAN, DETROIT 13, MICH.

SPECIALISTS ON SPUR AND HELICAL
INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND
ELLIPTOID TOOTH FORMS



Barnaby "Jam-Proof" Non-Releasing Tap Holder

Barnaby "Jam - Proof" Non - Releasing Tap Holder, is announced by the Barnaby Manufacturing and Tool Co., 70 Knowlton St., Bridgeport 8, Connecticut.

A small amount of float is incorporated in the holder to compensate for any slight misalignment in the machine, and, in addition, two free - sliding cylindrical

guide keys are provided to further ensure trouble-free operation. The extra-heavy set screw of the unit is constructed to withstand long use without stripping, and all holder parts are precision made and hardened for maximum service life.

The Barnaby Jam-Proof Non-Releasing Tap Holder is available in three sizes with shank diameters of $\frac{5}{8}$, $\frac{3}{4}$, and 1 inch.

Siewek No. 1500 Midget-Type Spring Jig

Developed to fill the need for a small, lightweight jig for handling many small items, including radio parts, electrical devices, and a large variety of other small parts, a midget-type spring jig weighing $6\frac{1}{2}$ lb. is now being offered by the Siewek Tool Division of Domestic Industries, Inc., 231 S. LaSalle St., Chicago 4, Ill. Built to precision standards, the jig, which is designated as the No. 1500, incorporates a powerful, positive locking action to avoid release under chatter.

Additional features claimed for the unit include the absence of backlash and provision for right and left-hand opera-



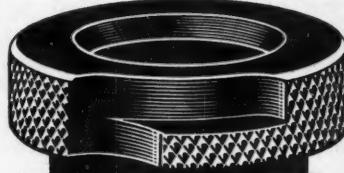
DOWEL PINS



Immediate Delivery!

Standard Size Dowel Pins from $\frac{1}{8}$ " to 1" diameter and from $\frac{3}{8}$ " to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

SCHULTZ & ANDERSON CO.
109 Edison Place, Newark 5, N. J.



QUICK DELIVERY
Write for Specification
Sheets and Prices . . .
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P.O. Box 37, Harper Station, Detroit 13

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GEARS

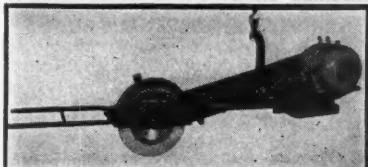
IN STOCK
Immediate
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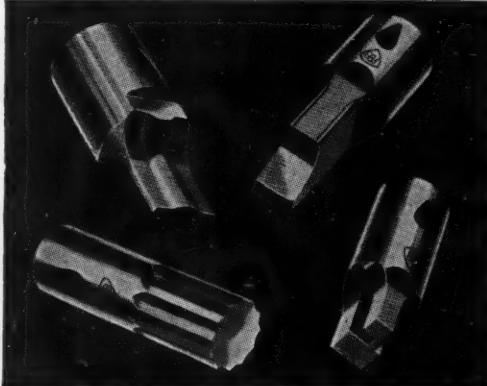
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CLIFF J. FORTHMAN

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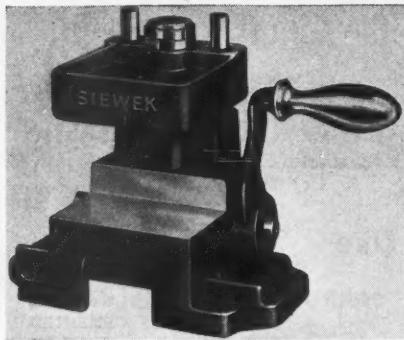
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Siewek No. 1500 Midget-Type Spring Jig

tion. Spring tension can be quickly adjusted by means of lock nuts located at the heads of the posts. Work is said to be locked firmly when the handle of the jig is down, with quick release being provided for, as well as ample room for chip clearance. Designed for the use of interchangeable top plates so as to save time on retooling operations, the jig can be quickly adapted to a variety of work

by redrilling a new top plate and equipping with new adapters.

Dayton Rogers Hydro-Pneumatic Die Cushion

A self-contained Hydro-pneumatic die cushion which is said to be particularly useful where draw ring holding pressures in excess of available shop air-line pressure are desired is announced by the Dayton Rogers Manufacturing Co., 2835 S. 12th Ave., Minneapolis 7, Minn. Through the use of hydraulic principles, ring holding pressures can be obtained on the Hydro-pneumatic cylinder up to 400 p.s.i. from an 80 p.s.i. air line.

The Dayton Rogers Hydro-Pneumatic Die Cushion is designed for mounting to the press bed, with the pin pressure pad in direct contact with the bottom side of the bolster plate. A handwheel adjustment feature enables the pin pressure pad to be stopped at a predetermined position below the bottom side of the bolster plate when required. Such an arrangement not only compensates for variation in bolster plate thickness but also simplifies positioning of the draw

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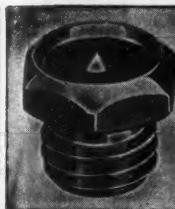
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(Turbine Type Tool)—
Takes Wheels Up To
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Collet $\frac{1}{8}$ ", Weight 12 oz.
Overall Length 6 $\frac{1}{4}$ "

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IN U.S.A.



MODEL TT

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Takes Wheels Up To
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(Vane Type Tool) — A Power Tool For The Heavier Jobs Taking Wheels Up To 2 $\frac{1}{2}$ ". Speed 10000 RPM, Collet 15/64", Weight 2 lbs. 4 oz., Overall Length 9"

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ring relative to the dies used.

The Dayton Rogers Hydro-Pneumatic Die Cushion is especially adapted for high ring holding pressures, particularly in the drawing of thin stainless steel and other thin stocks. The overall height of the cushion has been held to a minimum so as to enable the cushion to be quickly installed on practically any punch press without the necessity of providing for a pit.



Republic "Jet" Republic "Jet" Twist Drill

Especifically designed for use in connection with unusually high spindle speeds and fast feeds, a twist drill for "hyperdrilling," to be known as the "Jet," has been announced by Republic Drill and Tool Co., 322 S. Green St., Chicago 7, Ill.

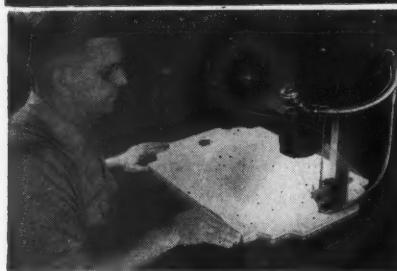
According to the manufacturer, stop-switch timing during test drillings have shown an elapsed time of only 8 seconds in drilling a $\frac{1}{8}$ -inch hole, 4 inches deep, with the drill, which provides for unusually fast penetration and maximum hole accuracy.

"Die Slick" Lubricant

A lubricant for die-casting dies employed in connection with the casting of aluminum, zinc, magnesium, and brass alloys, to be known as "Die Slick," is now being offered by G. W. Smith & Sons, 116 S. Sperling Ave., Dayton 3, Ohio. The lubricant is designed to form a tough, microscopic film on the vital parts of the die, thereby not only providing for excellent lubrication but also enabling the production of clean castings with fine surface finishes, it is claimed. According to the manufacturer, the film is always constant and is not "washed off" important parts by the stream of molten metal coming into the die.

Claimed not to discolor the castings or cause carbon deposits to cake in the die, Die Slick is available in 1 and 5-gallon cans and 25 and 50-gallon lots.

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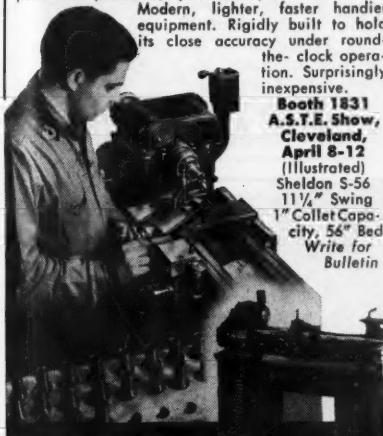
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Paasche Airbrush (Can.) Ltd., 110 Elm St., Toronto

SOUND INVESTMENT FOR TOOL ROOMS.....

Shop foremen say the little Linley Milling and Jig Boring Machine sure cuts tool room costs by saving larger machines for their rated capacity. Eight spindle speeds to 4250 r.p.m., and rapid changeover, give it wide flexibility in work on dies, jigs, fixtures, patterns and models.

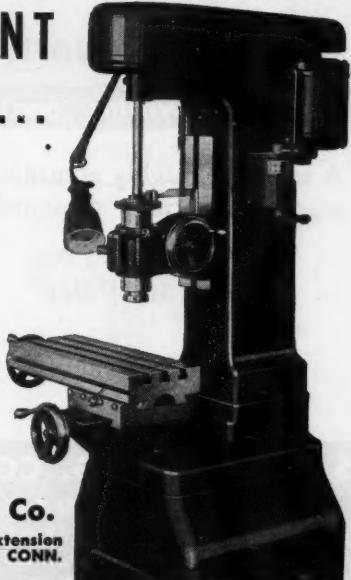
Grease-sealed ball bearings assure smooth feed... no backlash in quill travel... direct micrometer setting. Needs only $2\frac{1}{2}$ sq. ft. of space and has ample (7" x 17½") table for all small jobs.

Profits mount with a low cost Linley.

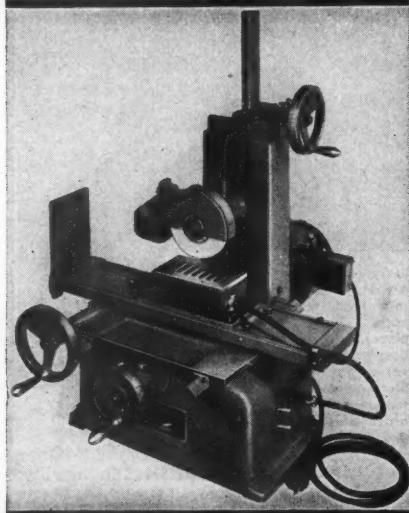
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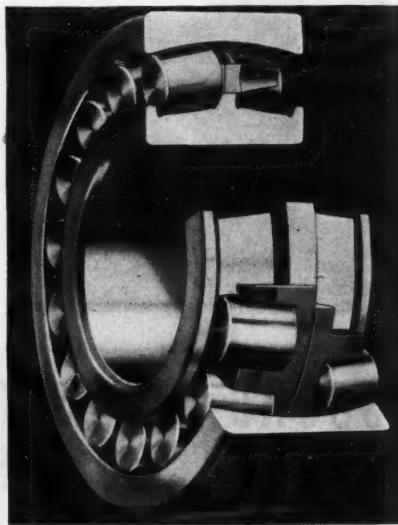
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SANFORD MFG. CO.
1279-81 SPRINGFIELD AVE.
IRVINGTON 11, NEW JERSEY

**Torrington Self-Aligning Spherical
Roller Bearing**

The addition of a self-aligning spherical roller bearing to its line of anti-friction bearings is announced by the Bantam Bearing Division of the Torrington Co., South Bend 21, Ind. The bearing is specifically adaptable to heavy duty performance in a wide range of equipment, including that used in steel mills, oil production, mines, and quarries.

In addition to the self-aligning feature, the Torrington Spherical Roller



**Torrington Self-Aligning Spherical Roller
Bearing**

Bearing offers two-directional thrust, high radial capacity, high thrust capacity, and unit construction for easy installation. The bearing is available in a full range of sizes from 1.5745-inch bore upward.

Bryant Pneumatic Pressure Vise

Arranged for easy toe operation through a three-way foot valve, a pneumatic pressure vise for holding parts where pressure must be controlled up to 4,000 lb. is announced by the Bryant Products Co., 297 W. Michigan Ave.,

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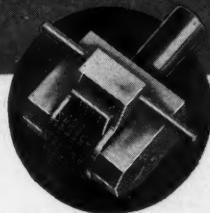
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ARGUTO OILLESS BEARINGS

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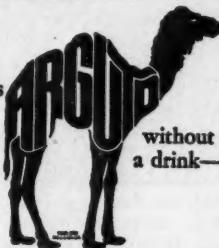


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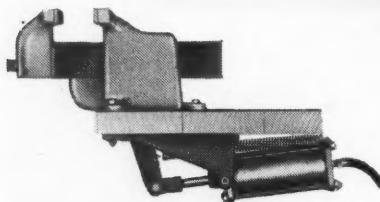


ARGUTO OILLESS BEARING CO.

WAYNE JUNCTION

PHILADELPHIA

Jackson, Mich. The vise includes a movable jaw which may be adjusted by the use of a hand crank, and has a 1-inch power stroke. The unit is supplied



Bryant Pneumatic Pressure Vise

equipped with a regulator valve so that the jaw pressure can be adjusted as required.

The Bryant Pneumatic Pressure Vise is constructed so that the jaws can be replaced with pipe jaws, punches and dies, and forming dies. The vise can be mounted on a bench as shown in the accompanying illustration or with the movable jaw up in the form of a small

press. The cylinder of the unit is hard chrome plated on the inside and the piston rod is also hard chrome plated.

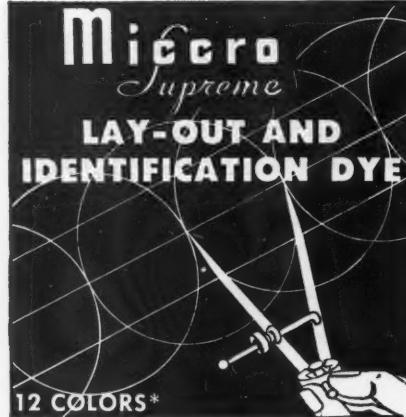
The jaws of the Bryant Pneumatic Pressure Vise measure 5 inches wide x 2½ inches deep and have a safe opening of 8 inches. The vise weighs 100 pounds.

Apeco Exposure-Computing Device

A simple exposure slide which is said to enable the operator of a photocopying machine to calculate in an instant the proper exposure time for any item he wishes to copy has been developed by the American Photocopy Equipment Co., 2849 N. Clark St., Chicago, Illinois.

Useful in connection with the photocopying of documents ranging from original tracings on very thin paper to newspapers, photographs, blueprints, and so on, the slide, which is now being distributed to owners of Apeco Photocopy equipment, is made of high quality varnished cardboard, measures approximately 6 inches x 3 inches wide, and holds a movable chart whose figures appear through slots on the front face of

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Introducing KENNAMETAL TOOLS with "Screwed-on" Tips

TO HELP YOU CUT TOOLING COSTS ON MANY MACHINING OPERATIONS

Kennametal tools bearing tips attached with recessed-head screws—an arrangement developed and perfected by Kennametal Inc.—provide a practical, new way of obtaining even better performance from inherently efficient Kennametal.

The screwed-on assembly is a positive, simplified mechanical fastening of streamlined design. The screw, angularly positioned, serves merely to hold the tip firmly in the shank (heat-treated) against the recess walls, which themselves resist the main cutting thrusts.

These new tools offer you many advantages, including: Easier, cheaper attachment, in your shop, of tip to tool; greater tip durability and more consistent performance; opportunity to interchange tips quickly in same shank; minimized stock keeping.

Kennametal "Screwed-on" tools are now available in larger sizes of fifteen different styles. Standard tips are made of different Kennametal compositions, for cutting steel, cast iron, or non-ferrous metals. Catalog particulars and prices are yours for the asking.

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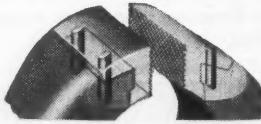
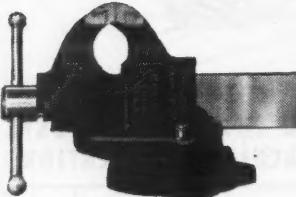
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STYLES 810ST, 810OT, 810OP, 810PT, 810SP, 810WP

Replaceable tool steel jaws "WELD" your work in place!



Your work and the work-bench become one piece when you use a Parker Vise. Tool steel jaws hold tight and rigid . . . yet are easy to replace when worn, adding years to the life of your vise. Ask your distributor about the five other features of Parker Vises. The Charles Parker Company, Meriden, Connecticut.

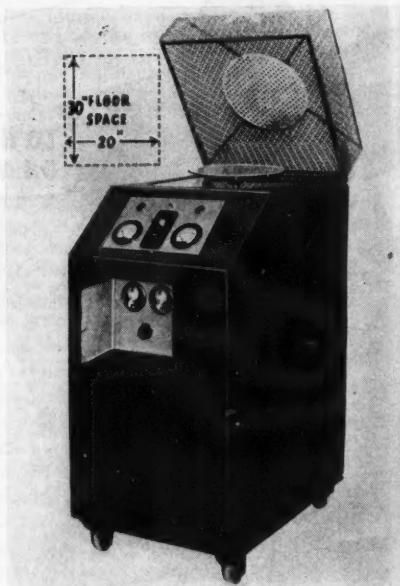
PARKER VISES 

America's First Vise Maker

the rule. Exposure time is given for five types of reproduction; namely, positive, and reflex, reverse, alternate and readable negative.

Thermall "Champ" High Frequency Heating Unit

A high frequency heating unit which is said to heat 6 lb. of material to molding temperature in one minute, to be known



Thermall "Champ" High Frequency Heating Unit

as the "Champ," has been added to the line of Thermall equipment offered by W. T. La Rose & Associates, Troy, N. Y. Preforms or powder is fully visible at all times, it is claimed.

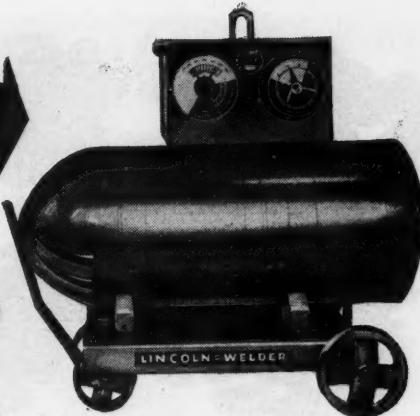
Arranged for ready operation by simply connecting to a 220-watt 440-volt 3-phase a.c. supply, the Champ is mounted on rubber wheel casters, measures 20 inches wide x 30 inches deep x 49 inches high, and weighs 500 lb. The unit features one-control operation; dual safety interlock switches, electrical and mechanical; and automatic electric time control with intervals from 0 to 3 min-

or five
positive,
read-

SURPLUS

ARC

WELDERS



Here is a chance to pick up arc welding equipment in any desired quantity at low cost. Large quantities of 300 to 400 ampere MG type welders—primarily of Lincoln and Hobart make—are available for sale. Largest inventories are in the Boston, Detroit, Cleveland, Chicago, Atlanta, Nashville, Houston and Philadelphia offices of War Assets Administration. They may be obtained, however, by contacting any of the War Assets Administration offices listed below. Equipment from 200 to 400 amperes in DC, gasoline-engine driven and AC sets are available in smaller quantities . . . also multiple operator types and related equipment such as electrodes, welding rods, weld positioners and flame cutters. Spot, seam and flash welders are likewise available. The equipment is for both production and construction. Write, wire or phone your War Assets Administration office today.

ALL ITEMS SUBJECT TO PRIOR SALE

FREE FACTS

TO WAR ASSETS ADMINISTRATION:
Please send me information on availability, condition and location of the following types of equipment:

- | | |
|--|--|
| <input type="checkbox"/> HOBART ARC WELDERS | <input type="checkbox"/> RESISTANCE WELDERS
(spot) (seam) (flame) |
| <input type="checkbox"/> LINCOLN ARC WELDERS | <input type="checkbox"/> FLAME CUTTERS |
| <input type="checkbox"/> WESTINGHOUSE
ARC WELDERS | <input type="checkbox"/> WELD POSITIONERS
(capacity) |
| <input type="checkbox"/>ARC WELDERS | <input type="checkbox"/> WELDING ROD
OR ELECTRODES |
| <input type="checkbox"/>(other equipment) | |

Name State
Firm
Address
City
116-1

LINCOLN DC Type: 300 to 400 amperes

This and many other types and makes of welding machines and related equipment are available from war surpluses.

HOBART

Standard models of this make available in large quantities and most ratings.

WESTINGHOUSE

Portable models available in limited quantities.

RESISTANCE WELDERS

Spot, seam, butt and flash type welders for production operations—also portable or gun types.

WELD POSITIONERS

Many sizes and capacities, including head and tail stock combinations.

FLAME CUTTERS

Both single and multiple torch type, portable and stationary.

VETERANS OF WORLD WAR II

To help you in purchasing surplus property, veterans' units have been established in each War Assets Administration Regional Office.

WAR ASSETS ADMINISTRATION

OFFICES LISTED BELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cleveland • Dallas • Denver
Detroit • Nelson • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville
Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia
Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane
Cincinnati • Fort Worth (Telephone 3-3381)

116-1

Norton Alundum
Abrasive for
Tumbling

Norton Alundum
Abrasive for
Tumbling

Alundum Abrasive is now being marketed by the Norton Co., Worcester 6, Mass., in a special form for use for wet tumbling. It is described as a hard, heavy, tough, and fast-cutting aluminum oxide product that is said to be excellent

for cleaning, deburring, finishing and the development of a radii on a wide variety of metal parts.

Alundum Abrasive is available in four size groups; namely, $\frac{1}{4}$ to $\frac{1}{2}$ -inch, $\frac{1}{2}$ to $\frac{3}{4}$ -inch, $\frac{3}{4}$ to 1-inch, and 1 to $1\frac{1}{4}$ -inch diameters, either untumbled or tumbled (sharp corners rounded). The accom-

utes by seconds. Compounds requiring different time cycles may be heated simultaneously. The unit is constructed with a sturdy steel angle frame encased in heavy gauge steel finished with black baked-on wrinkle paint. It is equipped with one No. 2000T Eimac power tube and six No. RX21 Eimac rectifier tubes.

**A NEW UNIVERSAL GAGE HANDLE
FOR REVERSIBLE TYPE PLUG GAGES**

CAP GREEN—GO

CAP RED—NO GO



Patent Pending

Each size handle will accommodate a comparable range of gage diameters to the Taper Lock American Gage Design standards—plain and thread. Just insert gage of any diameter within the range of the handle, turn the cap tight, and gage is ready for use. This handle will also accommodate the conventional American Gage Design Taper Lock shank. Six handles cover the entire range of from .020-.510.

Positive grip. Cannot slip. Will not mar or scratch gage. Light weight—made of aluminum. BURDICK DUALGAGES (reversible type) for use in new universal handle give TWICE THE WEAR—both plain and thread.

Write for descriptive literature.

AMERICAN GAGE DESIGN

PLAIN PLUGS—THREAD PLUGS

PLAIN RINGS—THREAD RINGS

THE S. J. BURDICK COMPANY

230 W. Huron Street

Chicago 10, Illinois

Have a Look at 'THE RECORD'



3 BRIGHTBOY TEXTURES:
STANDARD, FINE-TEX, TUFF-TEX.

IN this new Brightboy Catalog are records of machine speeds, time and work savings up to 20% and more, through rubber-cushioned Brightboy's simultaneous BURRING, FINISHING and POLISHING.

Now, to help you offset mounting production costs, you should have this invaluable Brightboy catalog, together with Brightboy methods and application data.

Your dealer will supply you. And Brightboy service men are ready to aid you with production-solution and product-improving recommendations. Write us.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
Newark 7, N. J.

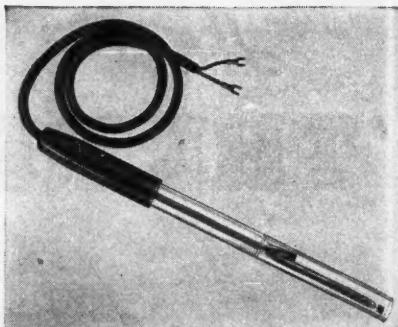


panying illustration shows the smallest and largest sizes in tumbled form and the other two sizes untumbled. According to the manufacturer, the extreme hardness of Alundum Abrasive provides for a continuous fast cutting action without glazing over.

Normally used with water and a cleaner, Alundum Abrasive for tumbling permits precision parts to be consistently held to a one microinch finish. Finishes with a higher micro reading than one can be improved using the abrasive.

Industrial Type CEL-F Conductivity Cell

To meet the need for a conductivity cell that can be readily and safely immersed in a vat or tank and just as readily withdrawn after readings are taken, Industrial Instruments, Inc., 17 Pollock Ave., Jersey City 5, N. J., has brought out the Industrial Type CEL-F Conductivity Cell illustrated herewith. The cell comprises a heavy-walled industrial Pyrex glass wand and a hard rubber handle. The glass body measures approximately 1 inch outside diameter x 20 inches long. The electrodes are of platinized platinum.



Industrial Type CEL-F Conductivity Cell

To use, the wand is simply plunged into the liquid and the conductivity read off in any desired terms from a correspondingly calibrated solu-bridge or conductivity bridge. The cell is said to be especially convenient for checking the strength of industrial solutions in tanks or vats, including pickling solutions. The cell is provided with heavy rubber-covered leads and is available in a wide range of cell constants. Although pri-

Off the Floor Deliveries!
ON
TRINDL SUPER INDUSTRIAL ARC WELDER
DESIGNED FOR HIGH SPEED PRODUCTION ARC WELDING

TRINDL SUPER INDUSTRIAL ARC WELDERS, the result of many years of careful engineering and "job tested" research, are rolling up impressive production records. Acclaimed for superior performance, ruggedness, dependability, and economical operation. For better, faster welding; easy-to-operate TRINDL SUPER INDUSTRIAL ARC WELDERS will help step up your production schedules 20% to 40%. Manufactured in a range of distinctive sizes to accommodate every type of shop and production welding job. Trindl Welders, Electrodes, supplies, and accessories, available for immediate delivery, will save you both time and money.
Write, wire or phone for full details.

TRINDL PRODUCTS, LTD.

17 EAST 23rd STREET AS
CHICAGO 16, ILL.

BALANCING WAYS

Shops handling rotating parts find this simple, sturdy and thoroughly dependable device highly efficient for balancing and truing operations. It assures better work...saves time...saves labor. No leveling required.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate indication of whether or not the work is in perfect balance.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



Send for
BULLETIN 4-22

ANDERSON BROS. MFG. CO.
Anderson
BUCKEYED, ILL. U.S.A.



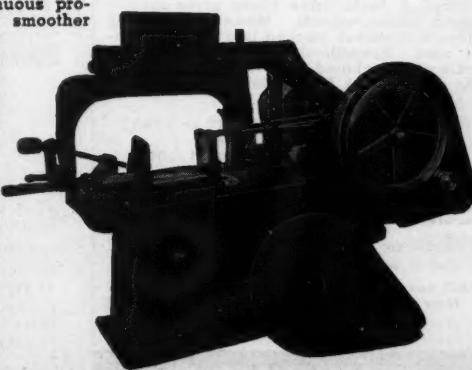
ROBERTSON'S ECONOMY SPEED HACK SAWS

The No. 4X Type Robertson ECONOMY Saw is especially suited for heavy, continuous production metal cutting and gives smoother action and faster cutting. Other salient features include—

- Bronze brushed journal bearings
- Standard stroke of 6"
- Automatic stop
- Gravity feed with adjustable pressure blocks
- Hydraulic lift on back stroke
- Standardized construction
- Accessibility to all parts
- Few adjustments.

Robertson ECONOMY Power Hack Saws are in use throughout the world—more than 30,000 have been installed. Make your next power hack saw a Robertson ECONOMY for speed and accuracy.

Robertson builds a complete line of Power Hack Saws in sizes and types to suit your needs. Send for illustrated folder Form 1-A which gives complete details.



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MACHINE & FOUNDRY CO., INC.**

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Fast, Accurate Measurements with

the NEW
Quick Action

AMIC

**VERNIER
CALIPER**

Size
6"

THE PERFECT TOOL
for machine shop,
garage, repair shop,
aircraft-maintenance, etc.

A flick of the thumb and you've got your external and internal dimensions. Knife-edged jaws provide exact thread measurements. A depth gage blade gives speedy depth measurements. Made of stainless steel or toolsteel; packed in a sturdy leather case. Scientifically engineered, painstakingly machined and American made, the AMIC Quick Action Caliper is a quality tool without a rival.

Graduations in English— $1/32$ " or $1/40$ ";
in metric—full mm.

Reading on Vernier $1/128$ " or $1/1000$ "
and $1/10$ mm.

Also AMIC Precision Vernier Calipers, Height Gages, Depth Gages, Pocket Calipers, Comparators, Precision Graduated Metal Scales.

Write for FREE Booklet B and price list or telephone PEnnsylvania 6-0687

Visit our Booth, Number 110, at the A.S.T.E.
New Era Exposition in Cleveland, Ohio,
April 8-12.

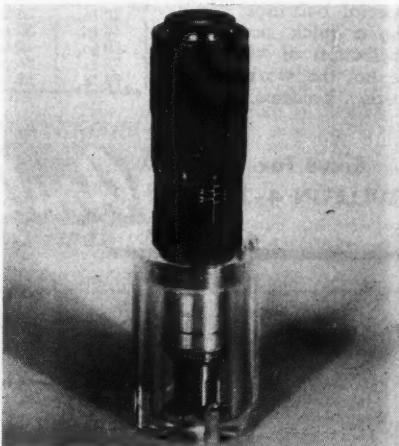
**AMERICAN MEASURING
INSTRUMENTS CORP.**
240 WEST 40th STREET
NEW YORK 18, N.Y.

marily intended as a dip cell, it can be conveniently clamped by suitable means and left in place.

Aireon Optical Micrometer

Especially designed for measuring the thickness of plastics or glass in hard-to-get-at locations, the Aireon Optical Micrometer illustrated herewith is now being marketed by the Aireon Manufacturing Corp., 166 W. Olive Ave., Burbank, California.

Essentially, the instrument consists of



Aireon Optical Micrometer

a microscope which can be screwed up and down in an outer tube, the lower end of which is a plastic nose piece that is held against the sheet to be measured. The transparent sheet is marked with a crayon on the side away from the instrument and the measurement consists in sharply focussing the mark in the microscope. The readings on the barrel and thimble provide directly the thickness of the sheet.

C-T Silent Stock Tube

Said to provide for the complete elimination of stock clutter and designed to provide for quick and easy installation, the C-T Silent Stock Tube now being manu-

Announcing

BALLFLEX

ANGULAR AND AXIAL

Anti-Friction Flexible Coupling

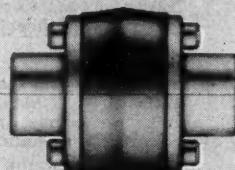
- Flexibility by mechanical means only! No fibre discs! No rubber discs! No sliding members! Friction is lowered to the minimum by the use of hardened steel balls through which all torque is transmitted. Free rolling movement eliminates side thrust and insures long life to both coupling and mounting bearings.



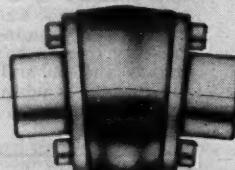
Write for Illustrated Literature and Full Information

The only flexible element
is the spherical bearing
component that retains the
lubricant and keeps out
dust and dirt—a new synthetic
product impervious to oil.

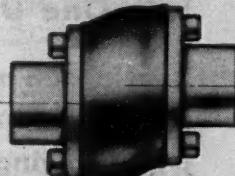
Exaggerated to show Ballflex Operation Under Varying Conditions



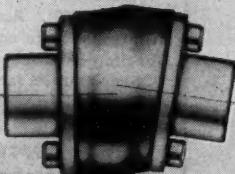
Normal operation with connected shafts in parallel alignment



Showing the effect of angular misalignment



Showing the effect of parallel misalignment



A combination of angular and parallel misalignment

Manufacturers of
FORMSFRAG—full complement,
over-running clutches
RZEPFA constant velocity
universal joints
MACHINES for the Formed
Wheel Grinding of gears,
rocks, splines and corrugations.

The



**GEAR GRINDING
MACHINE COMPANY**
DETROIT, MICH. U.S.A.

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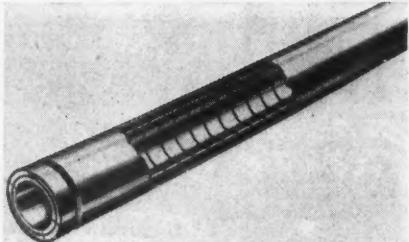
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C-T Silent Stock Tube

factured by the Corlett-Turner Co., 4011 W. Lake St., Chicago 24, Ill., can be used on turret lathes and any type of single or multiple-spindle screw machine.

The construction consists of a helically wound wear-resistant steel liner which is covered by a sound absorbent material and encased in a steel tube to form a compact, rigid, and efficient silent stock tube. It is made in 18 standard sizes ranging from a bar capacity of $\frac{1}{2}$ to $2\frac{1}{2}$ inches and, in addition, for some multiple-spindle machines, special size tubes are available.

Curtis Improved Packaged Air Conditioning Unit

The Curtis Manufacturing Co., 1905 Kienlen Ave., St. Louis 20, Mo., announces an improved model of its packaged air conditioning unit. The conditioner provides a complete air conditioning system in one compact unit which is designed to cool, dehumidify, circulate, and filter the air. It can also be adapted for heating and humidifying if desired.

Requiring only electrical and water connections for installation, the Unit is available in 3 and 5-ton capacities.



Curtis Improved Packaged Air Conditioning Unit

Alco Revolving Stop

Production of a revolving stop for automatic screw machines is announced by The Alco Tool Co., 152 Birdseye St.,

A COMPLETE HEAT TREATING DEPARTMENT in One Unit

Hardening Quenching Drawing

Temperature range: 200° to 2400°. Automatic temperature control. Recirculating draw. Quenching Oil is water cooled. Foot operated doors.

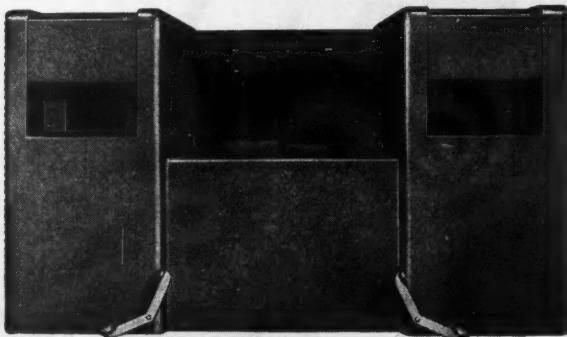
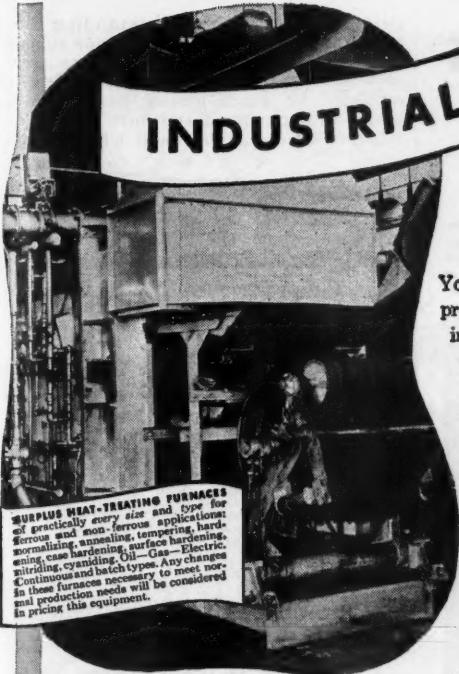


Photo shows doors open.

The Waltz Gas Fired Heat Treating Unit handles any type material . . . in toolrooms, tool and die shops, experimental and control laboratories, production shops. Floor space: 116" wide x 38" deep. Write for folder giving complete details.

WALTZ FURNACE CO.

1549 ELIZABETH PLACE
CINCINNATI 29, OHIO



INDUSTRIAL EQUIPMENT

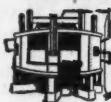
GOVERNMENT-OWNED SURPLUS FOR SALE

You can acquire now at good value, long needed production equipment—such as the heat treating furnaces shown in this advertisement. Check your operations today. Find out where additional or replaced equipment would cut your costs or speed processing.

Then go over your needs with your nearest War Assets Corporation Regional Office*. From the vast quantities of surplus industrial equipment on hand you will be able to pick, in all likelihood, exactly what you need at a very low price.

*In directories simply look up Reconstruction Finance Corporation. War Assets Corporation is an RFC subsidiary.

VETERANS OF WORLD WAR II: To help you in purchasing surplus property from War Assets Corporation, a Veterans' unit has been established in each of our regional offices.*



ROTARY HEARTH

For heat treating in production operations. Semi-automatic operation and control.



TEMPERING FURNACE

For tempering small work in production or for the tool room or laboratory.



INDUCTION HARDENER

The latest development in controlled surface hardening by high frequency induction. A complete heat-treating unit that can be spotted strategically in the production line.

CHECK THIS LIST FOR THE EQUIPMENT YOU NEED

Without obligation, make sure your name is on the list for complete information on the types of industrial equipment you need. Simply mail this coupon.

- | | |
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| <input type="checkbox"/> Heat-treating furnaces (for all purposes) | <input type="checkbox"/> Thermal dryers-dehydrators |
| <input type="checkbox"/> Gantry type cranes | <input type="checkbox"/> Generator sets (internal combustion engine driven) |
| <input type="checkbox"/> Extrusion Presses | <input type="checkbox"/> Baling presses |
| <input type="checkbox"/> Electric and Pneumatic tools | <input type="checkbox"/> Electric copper cable |
| <input type="checkbox"/> Centrifugal and rotary pumps | <input type="checkbox"/> Anti-friction bearings |
| <input type="checkbox"/> Welding equipment | <input type="checkbox"/> Bonded and coated abrasives |
| <input type="checkbox"/> Chemical equipment | <input type="checkbox"/> Cutting tools |

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TITLE.....

COMPANY.....

ADDRESS.....

2724

A DISPOSAL AGENCY MAINTAINED BY THE SURPLUS PROPERTY ADMINISTRATION
FOR SURPLUS PRODUCERS' AND CONSUMERS' USE.
All Surplus Goods, Aircraft and Plants formerly handled by the Reconstruction Finance Corporation...
and for Consumers' Use.
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(A SUBSIDIARY OF RECONSTRUCTION FINANCE CORPORATION)

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Hissing Air Guns are expensive!

Leaking Air Guns waste power and cause needless wear of air compressors. That is why leading plants use AIR-O-CHEKS—the *Leakproof* Air Guns that have no packing glands.



Comparison quickly demonstrates AIR-O-CHEK superiority. That's why four out of five plants standardize on AIR-O-CHEKS after a comprehensive test.

Try it. Install a dozen AIR-O-CHEKS and compare results.

AIR-WAY PUMP & EQUIPMENT CO.

403 S. Jefferson St., Chicago 7

Bridgeport 4, Conn. Outstanding features claimed for the unit include rugged construction with dual bearings completely enclosed to prevent the entrance of chips or dust; proper hardening to withstand continued and hard usage; revolving action of the head which comes



Alco Revolving Stop

in contact with the work end, thus eliminating the picking up of grit, chips, or dust which might cause roughing of the work; and positive and easy action for retaining accurate lengths on production runs.

The Alco Revolving Stop is made in sizes from 3 to 6 inches overall length, $\frac{5}{8}$ to $1\frac{1}{2}$ -inch shank diameter, and $\frac{3}{8}$ to $1\frac{1}{2}$ -inch contact diameter of head.

Peck Welding Fixture Design Service

A service which comprises the designing of special work-handling fixtures to assist users of the automatic process of shielded metallic arc welding in obtaining maximum production is announced by the Cecil C. Peck Co., 22701 Lake Shore Blvd., Cleveland 17, Ohio.

The service, it is stated, has already proved successful in a number of "Lincolnwelding" applications where individually designed fixtures have greatly influenced fabricating speeds and made possible the mass production of automatically welded units for reflectors.

SAVE FLOOR SPACE

... and height space with YOHE STORAGE RACKS. Speed up handling. Protect stock. Furnished in capacities of 10,000 and 12,000 pounds for storing bars 10 to 20 feet long.

WRITE FOR FOLDER.



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946

Injection Molds Completed

5 TIMES FASTER
ON A
GORTON

3-DIMENSIONAL
PANTOGRAPH

JOB FACTS

NAME OF PART—Injection Mold.
MATERIAL—Tool Steel (oil hardening).
MACHINE—Gorton 3-Dimensional Engraver Model 3-L.

ATTACHMENTS—Standard three jaw chuck mounted on table.

TOOLS USED—Special Cutters ranging from .035" dia. to .340" dia.

TEMPLATE USED—2 to 1 frill shape master.

FORMER TIME—15 hours per mold.

PRESENT TIME—3 hours per mold.

ACCURACIES—All dimensions held to .0005".

HOW TO PREDETERMINE THE RESULTS OF TOOLING YOUR JOB ON A GORTON PANTOGRAPH

Send detail prints or a work sample to Gorton Engineering Service at the address below. Tooling information and production estimates will be furnished promptly—no charge or obligation. You can then predetermine the possible improvement over your present methods.

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ACCURACIES HELD TO .0005"

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Accuracies were hard to maintain. Machine down-time was excessive. Man hours were wasted.

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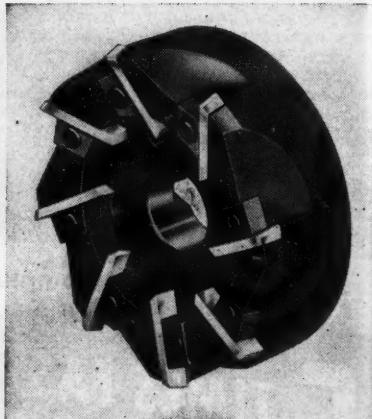


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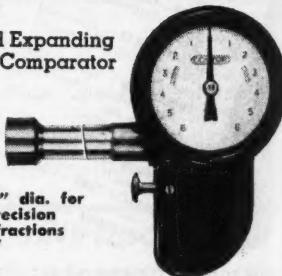
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"Universal" Face Kennamill

In describing the "Universal" Face Kennamill on page 326 of the March issue of MODERN MACHINE SHOP, the illustration herewith should have been used instead of that originally included.

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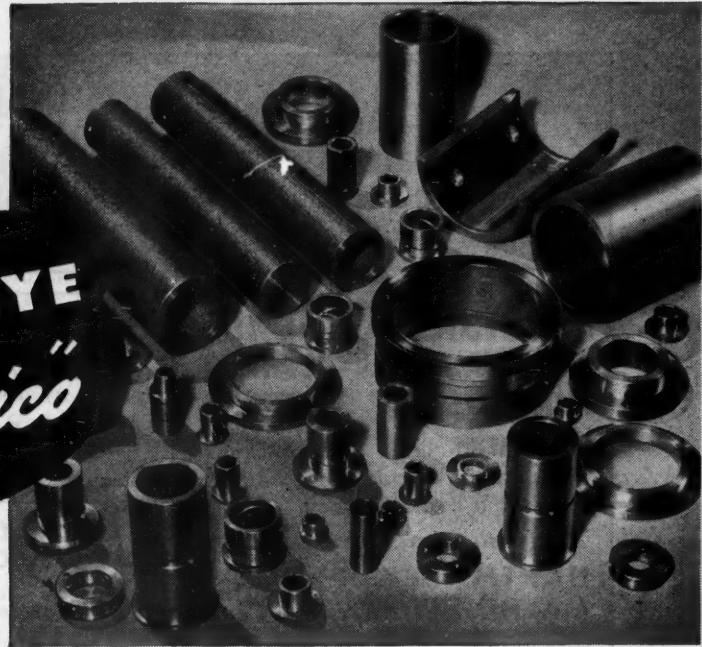


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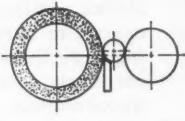
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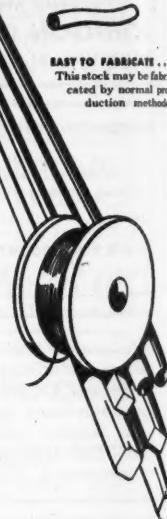
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Mead Air Power Catalog. Mead specialties Company, 4120 North Knox Ave., Chicago 41, Ill., announces a new edition of the Mead air-operated devices Catalog, which is now ready for distribution. In addition to several entirely new items that are made available to industry for the first time, the Mead Air Power Catalog lists, illustrates and describes the following air-operated devices: presses, vises, collet fixtures, work holders, work feeders, filter and pressure regulators, hand control valves, foot control valves, manifold (for distributing air).

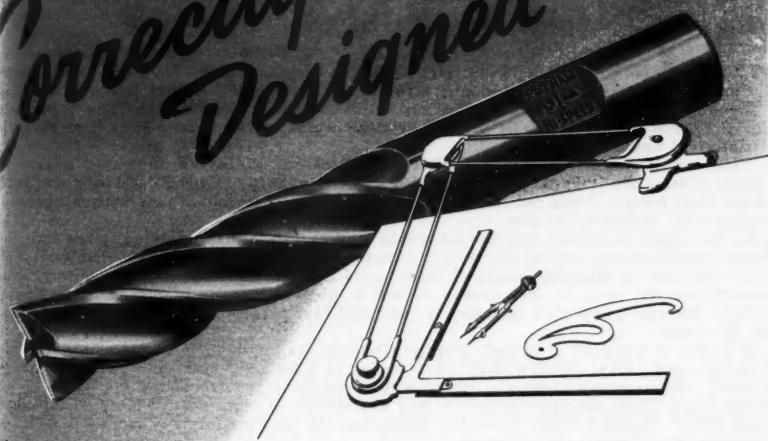
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Guest Editorial

By JAMES F. LINCOLN

President, The Lincoln Electric Co., Cleveland, Ohio

THOUGH I am no fanatical "Christer," I believe the Scriptures. They are eternal law. They make man important. Let me quote them: (Hebrews II:6) "What is man, that Thou art mindful of him? . . . Thou madest him a little lower than the angels. Thou crownedest him with glory and honor, and didst set him over the works of Thy hand. Thou hast put all things in subjection under his feet."

What makes man important? A job? I don't think so. Webster's dictionary says, "A job is a piece of work that falls to one to do." On that basis there are 100,000,000 jobs available, and always have been . . . and more. Trouble is that many are unskilled jobs with minimum wages. Security jobs, unworthy of man.

No one wants a job just because he wants to work. He'd take anything, were that the case. What we want is not jobs at all. It is a standard of living. The problem of industry is not to create jobs but to eliminate many of them . . . to discard, rub out, blot away any cause that would make any man for any reason accept a job which actually blocks his opportunity to increase his own production in order to command the increasing standards of living he wants and deserves.

Is money a standard of living? Hardly! Dollars have nothing to do with the cost of living. In almost every other country, they have money to burn right now, and yet they are starving to death. Money always becomes cheap when production is low. That's the cause of inflation. It now takes 30,000 Chinese dollars to buy a package of cigarettes. Plenty of folding money there! Why? Because there are so few cigarettes. In fact, in Germany money is so cheap that cigarettes have become legal tender.

You can't wear money. You can't eat money. The only thing you can do with money is to give it to someone in exchange for some thing real and valuable.

The cost of living is in things, not money. If we will double the variety and amount of things produced, standards of living will be doubled. And the value of money will increase. It will take less and less of money to own more and more of the necessities and luxuries of life.

The real reason we have a lower standard of living right now is not because there is less money around. We have more money in circulation than we have ever had in the history of the country. But try to buy a pair of nylons, an automobile, or a new suit of clothes. Low production . . . that's the trouble.

Is social security a standard of living? I think not. A government can guarantee a job, but jobs under the government were called, centuries ago, by another name . . . feudalism. Before that, guaranteed jobs were called slavery. When we go to the government today and ask: "Give me social security . . . give me a job . . . see that I am properly born . . . see that in case I am sick, I'm taken care of . . . see that I have a proper funeral and that my children are taken care of when I die" . . . when we ask that, we are asking for nothing more than serfs and slaves received centuries ago.

Can you win a standard of living and its enlargement by taxation and its increase? No, sir, brother. Just the opposite!

When government takes a five dollar bill from your pocket in taxes, you have five dollars less with which to buy things. And jobs are going to be destroyed by that amount.

It is perfectly obvious that when government steps in and taxes the individual so that the same government can give people jobs or security, by that very act the need for that security and those jobs becomes that much greater.

After all, your employment and your opportunity and your standard of living, as does mine, depends upon the enlargement of purchasing power by the consumer, which depends upon the enlargement of productive power by the wage earner, which depends upon providing the incentive and opportunity for all our latent talents as individuals. It is those God-given talents which make us free men.

Incentive and productive power alone distinguish us among all the animals. Shirk, dodge, curb incentive and productive power, and you begin slowly to reduce yourself to an animal's living standards. Isn't that what is happening all over Europe today? Should it happen here, and with you or me? No need for it to!

What makes man important? His latent capabilities. Nothing else. The skills he can develop . . . The standards of living for which he strives. The opportunities he dares. The energy he wills to use in increasing his useful productive power. It is upon these that the brightness of his future has always depended.

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Given a chance, how does it work out? I can speak only for the company which I manage, for in it I have had the personal opportunity to give principles free exercise. In the last 12 years, we have been able to increase output per man better than 12 times, always producing the same generic thing as previously. We have increased the individual's "take home" income better than four times, the average now being over \$5800 per year. We have reduced selling prices of Lincoln products better than 60 per cent. There has been no management-labor strife. Lincoln employees have had continuous employment, steady income, more jobs at higher skills. We have won wider markets. Workers have gained higher standards of living, continuously. Everyone has gained. The company has constantly secured sounder financial stability.

In all this fracas of restrictive legislation which seeks to curb, deny, prevent the individual's right towards greater production as the only true way towards greater standards of living, it would seem wise that as intelligent and skillful workers we ought to curb the curbers from curbing us in the outworking of our God-given rights... opportunity and incentive. Give us the chance to shape our own destinies as individuals. That is what will make us remain important... because it always has.

Hanna Hydraulic Cylinder Calculator

A calculator for use in easily and quickly computing the different factors in hydraulic cylinder application is now being offered by the Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill. Designed to eliminate the need for multiple tables, graphs, charts, and so on, the calculator instantly and accurately provides required values based upon other values in the same scale. Nineteen distinct operations may be performed on its scales, including the determination of cylinder size, pressure, cylinder speed, and size of pump, valves, pipe, and motor.

Measuring 10 inches long x 3½ inches wide, the Hanna Hydraulic Cylinder Calculator is available free of charge to mechanical executives addressing requests on their company letterheads.

Danly Dowel Pin Drill and Reamer Charts

Danly Machine Specialties has announced a new series of Dowel Pin Drill and Reamer Charts cataloging their line of precision dowel pins. This handy, one-page chart contains explicit drilling and reaming instructions for dowelling in cast iron and steel. Convenient for shop display and use—prepared on cardboard and light paper stock, and in plain and varnished finishes, these charts have met with approval from tested dealers and customers.

Copies of this Dowel Pin Drill and Reamer Chart, trimmed to 6½ x 10 inches, can be obtained for tool makers and engineers by writing Sales Service Department, Danly Machine Specialties,

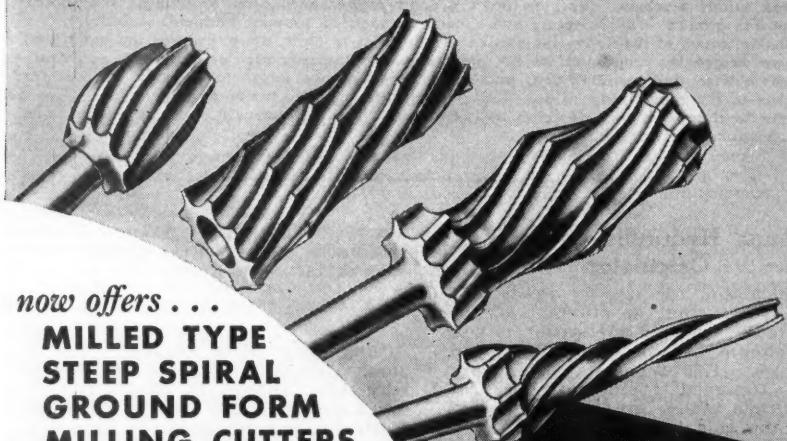
Inc., 2100 South 52nd Avenue, Chicago 50, Illinois. Specify heavy or light stock; plain or varnished finish.

"Red Ring" Roto Shaving. The National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., has published an eight-page bulletin which fully illustrates and describes the Roto Shaving principle incorporated in "Red Ring" shaving machines for the rapid, close tolerance finishing of circular, flanged, cylindrical, and conical parts. Copy of Bulletin No. RS45-11 free.

"Your New Laboratory, Sir!" is the title of an eight-page booklet published by the Behr-Manning Corp., Troy, N. Y., announcing a pioneering service in the coated abrasives industry; namely, the provision of branch located methods and equipment demonstration rooms for industrial consumer use in pretesting their grinding, sanding, and finishing tool-ups on standard commercial equipment without disturbing their plant production schedules. Included in the booklet are random views of Behr-Manning Demonstration Rooms in its offices at St. Louis, Chicago, Boston, Cleveland, Detroit, and Troy.

Announcement is likewise made of forthcoming openings in the firm's branches at Philadelphia, High Point, Los Angeles, New York, and Cincinnati. Facilities for arranging immediate use of these centrally located laboratories by tool engineers, methods engineers, plant superintendents, industrial supply distributors, and others are covered in the booklet, copy of which is available free upon request.

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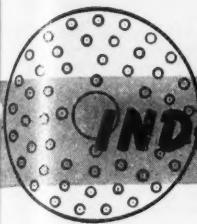
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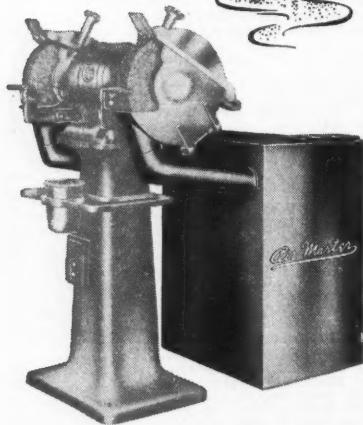
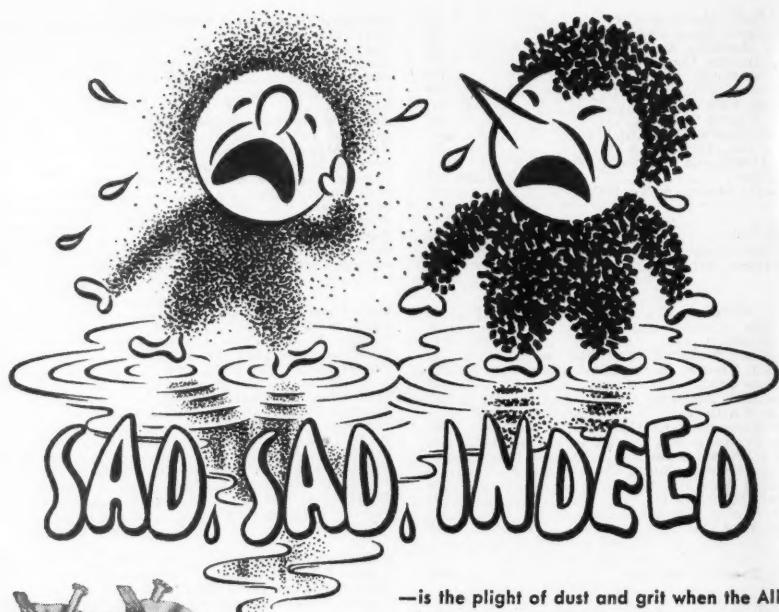


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18, 19	213	Warner & Swasey Co.	18, 19
255	18, 19	Warren Industries	255
208	255	Watts Brothers Tool Works	208
377	208	Weber Machine Corp.	377
40	377	Weldon Tool Co.	40
227	40	Wesche Electric Co., B. A.	227
308	227	Western Tool & Mfg. Co.	308
307	308	Wheel Trueing Tool Co.	307
336	307	Whitney Metal Tool Co.	336
336	336	Wiedemann Machine Co.	336
103	336	Williams & Co., J. H.	103
113	103	Wilson, K. R.	113
179	113	Wilson Mechanical Instrument Co.	179
168	179	Wirth & Son, Carl	168
340	168	Wood & Spencer Co.	340
189	340	Woodworth Co., N. A.	189
60	189	Yoder Co.	60
400	60	Yohe Supply Co., Wm. S.	400
342	400	Young Arbor Co.	342
323	342	Ziegler Tool Co., W. M.	323



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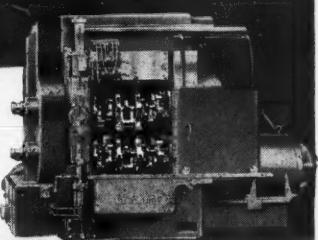
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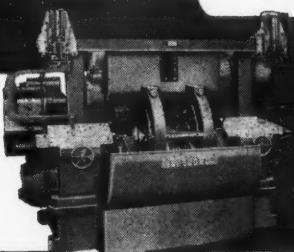
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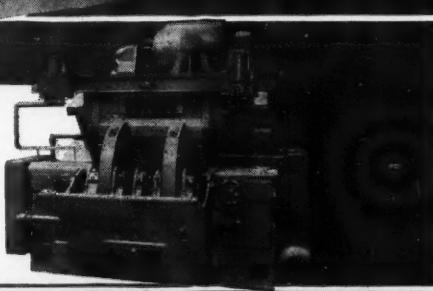
6AC two spindle, rough turns pin bearings on both spindles, or rough on one spindle, finish on the other.



7ACL Rough turns simultaneously on a single spindle all line bearings in one operation.

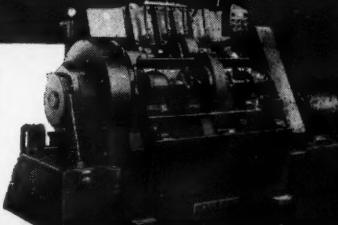


1LB Rough and finish turn line bearings at same chucking. Finish tools on separate cradle follow roughers immediately to reduce floor-to-floor time.

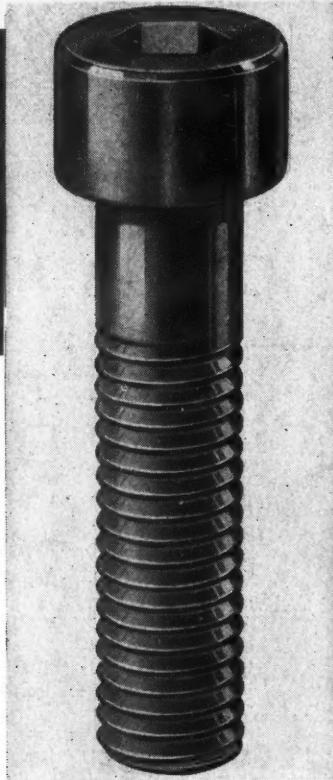


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